Alternate forms of income	deals were really good for us. But it's a whole… different business model. You spend a lot of time with paperwork. I mean you have to, you get the request for proposal, then you have to write the proposal, and then you have to get it, you know, pass it through. And they modify it. It's a whole lot of work for… you know, what you're doing. And the output is, we might just build one wafer. [Laughs] Right? So it's not getting the fab filled up, but it is getting money. So we, we did that because we also had a kind of a joke internally that we would do anything for a buck. And so we, we taught classes and we charged people. Because gallium arsenide was interesting, so we had people from all over the world come and take a Part 3 begins here
	Recording "Roesch Interview 4 of 4" 42 minutes and 47 seconds
0:00 Companies who worked with TriQuint	MA: Okay so we were talking about who your customers were at the start, and so government and Nortek. BR: Nortel. Yeah

	MA: Nortel, sorry. BR: It's a Canadian company, actually. That was a very big. They would build these huge phone switchers and we would sell parts for, like, 200 dollars. So it was great for us, because we could get thousands on a wafer. We loved that business. It was great business.
Break with Tektronix	MA: And you kind of broke from Tektronix just because they didn't have any need for the product? BR: Yeah, they just didn't, they really didn't. I mean, we didn't have a lot of matches with their equipment. So, yeah it was, you know. It wasn't that they didn't like us, or anything like that, it was just we just didn't have a lot of business with them. And so they… they… you know we went public and they were still a major shareholder at that time, but they pretty much sold their shares. And made their money and got out of being a part of Tektronix, or TriQuint sorry. MA: And at that point did you change locations, at that point, move off the campus? BR: No, no. MA: Just hung around? BR: Yeah, you know we just formalized our agreements with them and so we, you know, we paid them rent and so on and so forth. And, and we did have a couple of parts that they were using. So, we pretty much outgrew the space that we had there. And there was no,

	they didn't want to give us more space. So, they had, they had multiple tenants like that, another company that was right next door to us was called Site, and they made… silicon devices that were image parts. They actually made one of the CCD's, is what they're called, Charge Couple Devices, that went into the Hubble telescope. So, and they were just, they were right next door to us in this big fab building that Tektronix built. So they had multiple tenants like that, that shared that space. And so they had, I really don't think they kicked us out as much as we just wanted to have our own place. We wanted to have this place that we, you know, built ourselves. And could own as our own.
Move into current building	MA: And what year did you move here? BR: We moved here in '98. We built it in '97. We- I remember going around with a couple of guys, actually with the president at that time, and looking at different buildings. Because we were trying to, we were trying to find the cheapest option that we could. And from time to time there were fabs that came on the market. But right at that time there weren't any. We couldn't find any space that really met our needs. And so we just did Greenfield here. And we scrimped as much as possible and so we built this for as little money as we could. Over the years that's cost us because we didn't use the highest quality materials and stuff. But, you know it was our own. It was TriQuint. So that was kind of fun. It was really a huge accomplishment, I think, for everybody that was working here that we had made it, right? We were our own company, really. We were totally out from under Tektronix. MA: How many people worked at TriQuint at that time? Had it grown?

	BR: I don't know, I could guess at a number, but…it must have been… 300 or so, maybe. MA: So it had grown quite a bit.
Move towards 24/7 shifts	BR: Yeah. Yeah. You know we were… we were- we had pretty much moved to the multiple shifts. Most of the time when we were on the Tek campus, we just had like a week shift and a weekend shift. And we weren't running 24/7. But when we moved here, I don't know if it happened at that same time or just right before that, is when we started going to a 24/7 operation. So… MA: Is that standard for-? BR: Yeah semiconductor fabs want to run full. I mean it's really an economy thing that if you're not full it's really hard. So, you need some volume to hit a critical mass. And we were always kind of right on that edge of having enough volume to be a going semiconductor company. I mean I have to admit in the early years, we were just a lab. And that's the way it was run. And that's pretty much the way we fit in at Tektronix, as a lab. But here we turned into a real fab. You know, not just a lab. I like to call the labs like a boutique. And we have competitors who today are still that kind of a size. But it's hard, it's really hard. When you get a certain amount of volume just a lot of things get easier and the 24/7 is one of those things. You just, you just wan to be running the fab as hard as you can to make everything pay. MA: Had the office culture changed a lot as it got bigger? Did it start to feel a little more like Tektronix? You were saying that-

Oregon culture vs. California culture	BR: Um… not so much. I mean I think that happened in the- after the millennium. You know, in the 2000's is maybe when we started to change. I think, I think it was pretty much a kind of a Tektronix atmosphere. Most of the people that came and joined the company called it an Oregon… culture. Because it's different than in California, you know, and other semiconductor fabs. So it's, it's not hugely different but it, to me it's the culture feel is quite a bit different from like Intel.
Intel	Intel is very confrontive and competitive. They have a process, I never worked at Intel, so I don't really know firsthand but, they pretty much compete everybody against everybody else and their natural plan is to fire 10% of the workforce every year, right? So they rank everybody and if you're in the bottom then you're asked to find a new job. They don't fire you from the company; they just move you around, right? To try to fit a better spot. And so in my opinion that makes people very individual, you know? It's hard to be a team, right? It's hard to, hard to try to make your team better when you know that you're vying for a job with your teammates. Again, I never worked there so I don't really know what it's like, but that's what people have told me.
TriQuint's business philosophy	Here it's never been that way, there's no competition- I mean we do rank people and we do, you know, try to get people to perform as best as we can, but it's very much team oriented. We want the team to succeed and not, you know, the individual really doesn't matter that much. I mean people stick out because they stick out, but it's not that they have to. It's not a requirement. So it's different. It's a different culture, at least between us and those kinds of companies. But, so when we get people from other companies that's what they say, it's "oh it's kind of laid back here" and "that must be the

	way they do things in Oregon" right? It's just different. And so, and that's probably true. But I have no perspective because I have never been any place else. It's just been Tektronix and TriQuint so that's what it feels like to me, is that. So it seems like the best parts of Tektronix because it's still small even though, you know, we are much bigger now. We still, you know that's what I tell people when I interview folks is at this company it, you just know that you make a difference. You don't have to wonder about what, what it is you do because what you do makes an impact on the business of the company. So it's not hard to figure what you're doing and you don't feel like a cog in a big machine. You feel like an important piece. And that's the way it feels to me, at least.
Technology bubble bursting	MA: How… there's been a lot of bubble bursting of the tech industry- BR: Yes. MA: Over the, the time you've been here. How has TriQuint weathered the storm? And I mean you said that you moved here kind of late 1990's, that's when a lot of companies were not doing so well. BR: Right. Yeah we did have, we did- we go with the cycles. And semiconductor industry has those cycles. You know, I'm not that sure about electronics in general, I mean, that's pretty much a yearly cycle for consumer things, I mean everybody's shooting for Christmas right? And so there's a natural- that cycle. But in semiconductors it seems like there's kind of a built-in cycle that they go through. What happens is, it's very strange but you can, you can bet on it. I mean you can, you can go to the stock

	market and count on the fact that… that they'll have a bust and then it's a slow recovery and as people pick up, what normally happens is they worry about being able to get enough. And so all the semiconductor companies are building as much as they can, but sometimes it's not enough.
Allocation	And they have this thing called the allocation where they just, you can only build so many and so you allocate to certain customers that ability to build what they want. And so what happens is when things start picking up and getting tight, then the customers will start ordering more than what they need, because they're afraid of allocation, right? They want to make sure they get it, so they over order and then eventually that leads to another bust, right? Because they have too much inventory, they get so much that they have to do something about it and so they just stop ordering. And so there's just a crash.
Cell phone business for TriQuint	And as long as I've been in this business it happens like, like on a three/four year cycle. You just, you do that. But in the last, say, seven years for us, it's been very steady. Because of the business that we're in, in the cell phone thing. Before that we did have a cycle problem. And even before that, back when we were trying to be a viable company in the early 90's, before we even built our building, we did have some tough times. And we actually did have some layoffs, where we laid off people a couple of times. And we didn't want to do that, but we had to. And so, we did have some pretty tough times but once we went public and figured out how to be a public company, then we didn't have layoffs after that.
Layoffs and going public	So that ended before we moved to this building. We didn't- I don't think we've had a lay off since we've moved here. But we did have some- we did have two big layoffs before that. Big, relative to our- just whenever you have to fire somebody who's working for you it's hard. It's a hard thing to do. So, we did that. And one of

	them was when we, when we did… go public in the very beginning. We had to go through that. Because we basically combined several companies together to get enough mass to be a real company. And that was- that was a hard time in the early 90's. MA: But now that the smart phones are using the gallium arsenide, you're in pretty good shape in terms-
Products changes over time	BR: We're in very good shape, and it's been, we have been in a- pretty much in a state of not being able to make enough. We just can't make enough for the customers that we have. But, you know, I have not illusion that this will also be a business that ends for us. I mean, I think I told you on the phone, in the… late 90's we were in the receiver part of the phone. And so we had a great business then where we sold a lot of receiver parts. And that business just went away in like a year, it just, they converted all the phones to digital, they didn't need TriQuint parts and the business just evaporated to nothing. So we had to switch over and that was a painful time of us… to figure out how to make power amplifiers. Because that was something that they did need gallium arsenide for. But it's not something that we built. We were, we were focused on the other side and so we had to convert the company. So it was lean, it was lean years. We didn't hire anybody we hunkered down. And did the best that we could. And I think that will eventually happen with power amplifiers too. Eventually they'll, they'll morph into something where we just can't do it anymore. I mean the thing- the hard part about the power amplifier market is all the parts in phones have to reduce in price 20% per year. MA: Hmm.

Needs for continuous innovation	BR: So they're just going to pay- our customers are going to pay is 20% less next year for whatever it is that we do for them. Even if it has to be better. Because they're trying to cram more phone calls into the same space and so the power amplifiers have to get more sophisticated and better and do that. But they still have to cost 20% less. And so the competition is going to get really hard. Because as the price goes down, it's harder and harder to make money, right? We've been good at that. We've been doing very well. But if you would have talked to anybody in this company five years ago, they would never even dream of selling a part for less than like five bucks. And now is 69 cents, right? Who would have ever thought that gallium arsenide could be that cheap? But it is. And we're still making good money but, you know, it's just it can't last forever. We have to recognize that that's going to happen. So we have to figure out what's going to be next, right? What can we get into that would give us either higher volume or higher dollars that we can work on. So, again the diversity of the company and being in the military, aerospace, those businesses are solid and unchanging. They don't grow much but, you know, we make a certain percentage of our income off of those businesses. And so we'll always have those kind of things and so when gallium nitride comes around, they'll be certain things that we can charge a lot of money for that those parts can do that no other parts will be able to do. We just have to be the first, right? Be as early as we can and be leaders in that market when we can get there. So, it's still, it's challenges it's just different challenges, right?
18:12 Changes in BR's job over time	MA: Right. So how has your job changed at TriQuint in the two decades you've been here? BR: Um, that's a good question. Well. As I mentioned to you I

	started out as a manager of the reliability group. And… I probably didn't change much at all for about five years. And then… let's see that would have been up to about '90… I'm trying to get all these times straight. Maybe more like ten years pretty constant type of a job for me. And then I… got um, basically I got promoted into my boss's job because he chose to do a different job. And so the president of the company at that time came and said, "how'd you like to do Richard's job?" I said okay, I'll do that.
Downside of management	I never really wanted to be a manager. There's certain parts of management that I liked. But I really liked the technology better. I liked, you know, I like breaking parts and figuring out why they break and how to make them not break, right? So that was the main part of my job and as I got promoted into the higher job then I got to do less of that. And I had to do more management stuff and like I said some of that was okay. And it was fun…reporting to the president of the company and going to board meetings and things like that. But it was also a lot of stuff that I didn't like about it too. So I did that for 12 years and in the middle in turns out that TriQuint grew enough that they started adding more executives. And so I didn't report to the president after about five years or so. So I reported to a vice president and that was actually better. Because I could get more things that I needed and I didn't have to spend time doing management stuff as much.
Technical ladder	So it was okay. And then what happened at TriQuint in 2007 was they started a thing called the technical ladder. Because they kind of had this issue where you could be an engineer, an individual contributor and there's a certain number of jobs that you could have. You could basically go from engineer one to engineer five. So for most engineers that's pretty good. Just fine. And it turns out that most of the time by the time- when people got to an engineer five then they became manager and they would manage other engineers,

	right? And that worked for most people. But for people that didn't, that absolutely didn't want to be a manager, they were stuck at five. And they had no place to go. If they wanted to go higher, they had to be a manager. So you had the engineering ladder and then you had the manager ladder. And in 2007 they decided, well we need something else. We need the technical ladder so that these people who are technical minded and want to be individual contributors and don't want to be managers can go higher. And so they invented this ladder, they didn't really invent it, other companies have it. Intel has it. They kind of modeled it after what Texas Instruments has, the ladder, so they, it's, they just copied it, right? And so at that time I had built a group of like 18 people that worked for me as a director. And some of the people that I had were really good people. And they were all stuck behind me, right? So I felt like, you know, there's this ladder thing, I've been having- I've had this job for 12 years. This might be my chance to get back and work more on the parts and less on the people. And, you know, I could let some of my really good people take my job and be director.
Move to TriQuint fellow position	And so I just did it. I just said hey, it's, it seems like a good change. So in 2007, I switched from being a director to being a TriQuint fellow, as a, on the technical ladder. And then a year, two years later, I was promoted to a senior fellow. So now I'm at the top of the technical ladder [chuckles] with no place higher to go but that's fine by me because now it's basically, I just get to mostly focus on… the fun stuff, right? And so for me it's perfect. I mean it's just worked it really great for what I want to do. So I've played around in the management thing and I know that that's not really where I'm the happiest. You know, like I said there's some aspects of that that I liked. I liked being included in, you know, in the

	executive information and that kind of stuff but I just, I know, I just really like working on the technology. And so I probably, I don't- I can't imagine being any happier in the place that I get to work at now.
24:50 Impact of tech industry on Washington County	MA: Okay, I want to switch gears a little bit and just talk about Washington County and- BR: Okay. MA: -how that influenced the tech industry. And then we can wrap up because I know I've kept you probably longer than I needed to. Do you live in Washington County? Or- BR: Yeah. MA: Okay, and have you ever considered moving to say another TriQuint facility, in Texas or anything, has that ever appealed to you?
Benefits of Washington County	BR: Well, I've thought about it but, um, I don't really want to move. I mean, I think most people just like whenever they're at. And so when we acquired other companies that was one of the things that amazed me is people just don't like to move. I mean we offered jobs to everybody that- of companies we acquire and they just don't like to move from wherever they're at. And so I like it here. I've always, you know, at Tektronix I lived, like, two blocks from the campus. So all of the five years I was there I walked to work every day, I just loved it. And then I moved to a place where I actually had to drive to work, but it was not very far. And then when we build this building I pretty much stayed in Beaverton. So I live in Bethany area, it's actually a

	Portland address but it's Washington County. You know it's pretty much Beaverton is where it's at. And so I have a fair commute and I don't really like that, but my family liked being in the Beaverton school district and so we just pretty much stayed there. People don't like to move, right? [smiles] They like to be where they're at. So I would much rather live out here and be within walking distance of work, but, you know, my family just liked it in Beaverton, so that's where we kind of stayed so that they could, my daughters, you know went to Westview High School and all that and so… they liked that so that's why we kind of stayed there. But I like being in proximity to where I'm working as much as I can. I
Pendleton "God's Side of Oregon"	have nothing really against… Washington County. I mean I grew up in Pendleton, which in my opinion is God's side of Oregon. MA: [Laughs] BR: Where it doesn't rain and it's really nice. But you know, the rain doesn't bother me that much so I'm happy to, happy to live here. My wife is from the coast. She's from Newport, so she's used to the rain. So, this is a very nice compromise for us to live in between the coast and Pendleton.
Silicon Valley	MA: And you mentioned that when you were first looking for work out of college you were not interested in working in the Silicon Valley. Was it too big- BR: Yeah MA: City, was that the- BR: Yeah I was a country boy. I grew up in Pendleton. I cut wheat

	for a living, you know, did farmer rancher type stuff and you know it's a town of 10,000 people. And I just really didn't think I would like city living. So I, I didn't really want to go there. I did go to interview just to see, you know, if there was anything special about it or not. And, like I said, that was a really thing about that time frame is you really got to get to know the company and you know they even gave you like an extra day so you could look around and check out prices of things. And of course Silicon Valley was crazy. I mean nobody lives within 50 miles of their work, let alone, you know, next door. And most of the people that I talked to and… checked out things with said, you know, they'd get like two or three college people together to be able to afford a place to live. And you know down in Silicon Valley. And it just wasn't worth it for me to do that. You know I just didn't want to, I didn't want to do that so. I wanted to stay in a smaller town environment.
Population growth in Washington County	MA: In the time that you've been in Washington County, how do you think the tech industry has changed it? Has it grown significantly? BR: Oh yeah. It's. Yeah, huge. Huge growth. Just all the, all the stuff between Beaverton and Hillsboro, you know, they used to be really separate cities and now they're grown together. And Aloha's trapped in the middle still. I lived in Aloha for a while so I know about that. But, yeah, just lots of, lots of population growth and lots of companies. I mean there's so many companies and most people don't know most of them. I mean they're just little hidden nooks and crannies of all different kinds of things and I think most of that is because of Tek. I mean it just spawned a, like a cottage industry of that kind of stuff. And so there's a lot of things that, you know, people just don't know about that goes on here.

	MA: Do you think it's changed the better or the worse in time you've been here?
How TriQuint benefits the community	BR: Well, it kind- it depends on your perspective. I mean from… if I was living in Pendleton, I would say that it's worse, right? Because I just don't like population growth and that kind of stuff. But for the people that live here, I think it's better. I think it's better; I think it's a good thing, right? I mean it's kind of what we talk about at TriQuint in terms of what we're really doing, right. You know we're in business to make money but we- it's fun for us because we make life better for people. I mean cell phones, some people might not like them, but it's a good thing, right? It makes life easier, better, you can connect to people. It's a good thing, I think. And so that's… that's the really satisfying part about what we're doing. When we were building fiber optics chips and things like that, it's harder to make that connection. But when you're in consumer things that your neighbor buys, it's a lot easier. You can say well, you know I, I improved their life a little bit. You know, just by being able to enable these different things.
GPS systems	Like GPS, for example. We built GPS circuits way back in the 90's. And some of our- other part of our company that I haven't really talked about in Florida, they had parts in the first GPS satellites that, you know, let those things work. And back then the government really kept the technology kind of away from consumers. So they could locate different things, but as far as the consumer people were, weren't allowed to use all the frequencies that pinpointed the stuff. So back in the old days, you could be like 100 meters was the accuracy. But it was on purpose. It wasn't that the technology couldn't do it. It was that the government just didn't want to let that out. Right? And so- but it was really cool, but

	nobody knew about it. Nobody really knew about what GPS was or anything like that. So we did a lot of stuff like that. And it's not near- like some- if it's something that your neighbor buys, it's a lot more satisfying than something that you know is cool but nobody else has heard of it. So, it's, that's kind of the way it goes. But it's fun now, it's very fun.
Why did Silicon Forest develop in Washington County	MA: So, you touched on it already, but in your opinion, do you think that Silicon Forest developed in Washington County solely because of Tek, or was there some other reason that it thrived here?
Impact of Tektronix	BR: Well, I think that's pretty much my opinion. But… that's my life experience, right? I came from Tek, so it's just my feeling that most of that other stuff came here because of that. You know, I have no idea why Intel came here. I mean they… they were- they, you know, they stopped really building semiconductors in Silicon Valley just because of all the environmental issues and things like that. And so they weren't going to build stuff there, most of the semiconductors, you know, moved to like Arizona and Texas and places like that. You know. I can't imagine why Intel came here other than the fact that they knew that there were technology people from Tektronix, right, I mean that were here. But I don't know that that's the reason they came here, you know. They got incentives from the state and other things; you know that they would get anyplace that they would go. But you know, I got to believe that they felt like there was a workforce here that they couldn't get in other places. And in the beginning, I think it all came from Tek. But they did, you know, they did the same thing with you know the different computer companies that started up. Because they, you know. Why did they come here? Same reason. Because I think that they knew that there was that core group of technology

	people that were here. But I don't know. I really, who would know? How would you decide? I guess if you ask somebody from those companies. But I bet there's very few people that know the real reason, unless it is just for that, which seems apparent to me, but again I'm an insider, so. I really don't know, I just, it just seems that way to me. That Tektronix was a magnet for that because again, they encourage people to do that. They just said go out and do, and you know, invent stuff. Play with things. Make it happen. And those people were all spinning out, trying to do that. Some were successful and some weren't. And if they weren't successful than those people could either come back to Tektronix, or hey, here's Intel, let's go work there. You know, or it just seems that way. But I never really have no way of knowing, I don't know if anybody does. MA: Well that's all the questions I have. Did you want to add anything that we didn't talk about? BR: No. MA: We pretty much covered everything? BR: Yeah, I don't know what is interesting or not interesting or anything, but certainly TriQuint was born from Tektronix. There's no question about that. And we would not have been here for any other reason.
Spin-offs from TriQuint	And like I said, we're a consolidator now, so we're sucking in other companies and making them part of us, instead of the other way. I mean, we did, we did kind of have a spin-off. But it- you know, I claim it as a TriQuint spin-off, but it was really actually another spin-off from Tektronix.

Cascade Microtech	There's a company called Cascade Microtech, which is a fairly large company. I don't know what their dollar volume is or anything like that. But they build a different type of instrumentation and what we call probe stations. And when TriQuint spun off, there were two guys that came from Tek to our company and they were very prominent designers of circuits here, but they also had learned about this probing technology while at Tek. And so they came to TriQuint. They worked here for several years, and then they spun out and started this company called Cascade Microtech, which grew to a pretty big company. I think for a time they might have been even bigger than TriQuint. They're not so big now, but they're still a viable company.
Employees switching companies	So I claim that Cascade is a spin-off of TriQuint, but just only in my mind primarily, but, so. And there have been people at TriQuint that have gone to other companies, of course. And you know, tried to work there and stuff, so, you know. There is some movement, but it's not like, it's not like Silicon Valley, or we have a factory in Costa Rica, where that's what people do, is they move from company to company, because that is the way they get raises, is they just move around. And they get, you know, they get a raise by going to this company and they work there for, I don't know, a year or so, and they go to another company and that's just, that's just the way it is. But here that doesn't happen so much. I mean, we've been getting a lot of people from Intel. There's very few
Solar World	people that go to Intel from here. We did have a few people that went from here to Solar World. Heard that Solar World has now 1,000 employees there. MA: Wow. BR: And they're the ones that got 80 million dollars from, uh, the

	President, to do solar cells, but I heard that they lost, they used it all up. So they're not making money yet, but we did lose quite a few people to that. Mostly from the fab. Those folks went there. And uh, but, we didn't. We rarely have people go from here to Intel, but we do have a lot of people recently that have come from Intel to here.
Challenges at Intel	MA: Due to the layoffs that they have over there? BR: Well yeah, they're, you know. They, they're, they had some trouble figuring out what they wanted to do. For a time they were going to try to get into building cell phones. And, so they have a pretty big operation that was working on that. And they decided- and then AMD would come out with a new processor and they would get all scared and say, [gasp], "oh we have to focus on our core business" and so they would, you know, go back and they would say, we're going to build microprocessors and forget about those phones, you know.
Tektronix as the mother of technology in Washington County	And so they would lose those people and they would come here. And so we've had, we've had a fair amount come here from Intel. But it doesn't usually go the other way, but there are people that do move around. So, and there's- I'm always amazed that people that you run into that have worked at Tektronix. And it's like, oh yeah, I used to work at Tektronix. Just, you know, meeting with the museum committee and stuff. It's like, most of them had worked at Tektronix, so, it just, like I said. That's my experience. They're kind of the mother of almost everything around here that's technology oriented. But, not everything. Just seems like everything. MA: Right. Okay, well I think, do you, do you want to add

	anything else for the record? BR: [shakes head no] **Tape Ends at 43:47**