

Gene W. Ray

*Interview conducted by
Joel West, PhD and Caroline Simard, PhD
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SAN DIEGO TECHNOLOGY ARCHIVE



Gene W. Ray



Dr. Gene Wells Ray, Ph.D. has been Managing Director of GMT Ventures, since 2005. Dr. Ray has an extensive experience in technology, defense and government relations. Prior to GMT Ventures, he founded and served as President and Chief Executive Officer of L-3 Services, Inc. (formerly L-3 Communications Titan Corporation, The Titan Corporation) since February 28, 2003 and from 1985 to July 2005 respectively. Dr. Ray co-founded Titan Systems, Inc., in 1985. He served as the Chief Executive Officer and President of Titan Systems from 1981 to 1985. He served as an Executive Vice President, General Manager and a Director of Science Applications International Corporation, Inc. for 12 years. He was employed at SureBeam Corp. He served for two years as Chief, Strategic Division, US Air Force and as a Defense Industry Analyst. Dr. Ray held the position of Senior Appointee (Public Law 313) on the staff of the Chief of Staff of the US Air Force, where he led a team of military and civilian analysts and scientists. Prior to that, Dr. Ray was with the Aerospace Corporation where he contributed to weapon system analysis programs and specialized in the area of nuclear survivability. He serves as the Chairman of the Board at Decision Sciences International Corporation and Decision Sciences Corporation. He has been Chairman of Global Secure Corp. since August 2005 and Cayenta Inc. since September 1997. He has been Chairman of L-3 Communications Titan Group since May 1999. Dr. Ray served as Chairman of L-3 Communications Titan Corporation from April 1999 to July 2005 and its Director since 1981. He serves as Director of CaseRev, Inc., Decision Sciences Medical Co LLC and Decision Sciences Corporation. He has been Director of L-3 Communications Titan Group since 1981. He serves as Member of Advisory Council of Proximity, Inc. He has been a Member of Advisory Board at Patriot Data Solutions Group Inc. since October 26, 2006. He served as a Director of AverStar, Inc. He also served as Director of Titan Systems from 1981 to 1985. Dr. Ray received a Ph.D. degree in Theoretical Physics from the University of Tennessee in 1965, a Master of Science in Physics from the University of Tennessee, and a Bachelor of Science in Mathematics, Physics and Chemistry from Murray State University in 1960.

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13 **WEST:** One of the things that we're puzzled about this is, why San Diego? Other than Irwin
14 decided that the winters were warmer here than in Boston, and he came out. A bunch of peoples'
15 little stories, they just happen to fall into San Diego. But, you came to San Diego because of some
16 guy named Beyster.

17 **RAY:** Yeah. That's right.

18 **SIMARD:** It seems like there's a lot of military communications and electronics contracting here in
19 the San Diego area. If you had to characterize it after GE or Convair went away and the aerospace
20 left, it seems that if there's any theme to the military consulting here in San Diego, it is some sort
21 of electronics or communication thing. But, we haven't come across anyone who could explain
22 why that is the case, other than that Irwin and Viterbi were kind of dabbling in their spare time
23 and they started Linkabit. Despite a lot of little individual happenstance stories, we haven't really
24 seen anything else. So, is it just that there were a few seeds that were planted here, or is there a
25 more rational or a consistent pattern to it?

26 **RAY:** No. I think you probably hit it pretty well on the head. I think it really goes back to two

27 independent seeds being planted. One, I think, was Bob Beyster. More importantly than Beyster
28 for the telecom industry was, was Irwin Jacobs. I can't tell you all the reasons why he came to San
29 Diego. I never talked with him about that. But, I think that has a whole lot to do with why there's
30 a telecom industry here today. There are a lot of other things that compliment and supplement
31 that. One is that UCSD is an excellent school. But, that compliments it. That's not the driving
32 thing. In fact, if I'm not mistaken, in the early days of Linkabit, the predominant recruiting came
33 from MIT and Stanford.

34 **SIMARD:** Yeah. We've had actually . . .

35 **RAY:** Even when we bought Linkabit in 1990, that still was where most of the recruiting came
36 from. There's nothing that explains who's the chicken and which one is the egg. Irwin Jacobs was
37 the one who created the business. Then he found the very best people that he could find,
38 wherever they were. Of course MIT and Stanford have a lot of very good people. Not that he
39 didn't recruit from other places. It's just that that seemed to be the predominant recruiting
40 grounds for them.

41 **SIMARD:** When I talked to Martha Dennis, she said, "I can't tell you how many recruiting trips I
42 took to MIT." [Laugh]

43 **RAY:** There were quite a few for Stanford as well.

44 **WEST:** You emphasized hiring the best people. Did the Linkabit hiring pattern, which I guess you
45 inherited when you acquired Linkabit, did that seem to be different than that of the other
46 electronics companies here in the area? Other than the fact that it was so weighted to a couple of
47 universities, were there other places that didn't try so hard to find the best people on a national
48 search, or weren't as successful, or anything like that?

49 **RAY:** I don't think many people were as successful as Irwin was. I don't think there's anyone that
50 has had the same business model. It's been an engineering, technology-driven business model, in
51 my opinion. Irwin could tell you much better than I can. It is one where you bring in the smartest
52 and the best. You give them a lot of freedom. You give them the resources they need. Then you
53 provide a focus and direction for where they do their work, and then you look out, because good
54 things come out of that. Now that's easy to say but it's difficult to do that. Not everybody uses it.
55 It is difficult to turn that into a good business. He was able to do that. I'm not sure there's anyone
56 else in the world that could have ever built a business that was anywhere near as successful, or
57 even just successful, as Irwin's using that model. He was able to do it uniquely well, in my opinion.

58 **WEST:** Can you think of any other San Diego companies that tried that and were even moderately
59 successful? Of those that were technology driven. Maxwell Labs, maybe?

60 **RAY:** No.

61 **WEST:** No, that was all contract, I guess.

62 **RAY:** No. I don't think I've seen a company that was as engineering and technology driven as
63 Linkabit was. I saw a little bit of Linkabit, because we acquired it. I don't know Qualcomm. But
64 my perception is, the same thing is true in Qualcomm.

65 **SIMARD:** Yeah. Qualcomm really became an intellectual property company.

66 **RAY:** Yeah, and incredibly rich in technology. I bet anyone would be surprised at all of the things
67 that are going on within Qualcomm today that one doesn't know about.

68 **WEST:** It seems kind of odd that he was able to pull it off in Linkabit. At least from my experience
69 as a government contractor many, many years ago, it's very rare that A, you're thinking very far
70 ahead. You're thinking about getting the next contract, and how you are going to deliver that.

71 And B, it is rare to be able to have in-house technology as opposed to stuff that you're transferring
72 to the government as part of your contracted research.

73 **RAY:** No. You can definitely do that. You're right. That's not the norm. That's not the normal
74 government contract way. But, we have certainly done that all the way along. Irwin did it in
75 spades. As you may or may not know, when he started Qualcomm, he started out with some
76 government contracts. I remember talking with him about it just as he was starting Qualcomm, his
77 plans were to bring in government contracts, but use those as the foundation for building a
78 commercial business.

79 **SIMARD:** Which is what he had done at Linkabit with the VSAT terminal?

80 **RAY:** He did that in Linkabit. That's correct.

81 **SIMARD:** How about Titan? How did you found your organization?

82 **RAY:** I came at it from a very different perspective. I came at it from SAIC. I was working for the
83 U.S. government and Bob Beyster recruited me to come out here. I became the thirty-second
84 employee of SAIC. SAIC was strictly a government contractor and the objective there was to bring
85 in the next couple of contracts, and later try to diversify very unsuccessfully into a commercial
86 business. At least it was unsuccessful while I was there. Then, I got into an argument with my
87 boss and I lost. [Laugh]

88 **SIMARD:** You didn't lose too badly, obviously. [Laugh]

89 **WEST:** What is the difference between the business models of Titan and SAIC? Are they both
90 strictly contract work for government or is there, like for Irwin and Linkabit, more of an attempt to
91 retain IP or to build competencies that are...

92 **RAY:** As was the case of SAIC and Linkabit and Qualcomm, the initial foundation of Titan was

93 government contracts. We started out, in Titan, with the philosophy that we were going to have
94 people working very closely together as teams to build a business. It was a different business
95 model than SAIC's.

96 **WEST:** Whereas at SAIC, you'd shift people around as needed for contracts?

97 **RAY:** No. It was, "You go build yours. You go build yours. You go build yours." That may not
98 sound like a very good business model, but it built a \$6 billion corporation. We did damn well with
99 it. But, Titan was different. We also set out, at the beginning, to have a public company, which
100 was very different than SAIC. To raise the capital we needed to expand and grow the business.
101 We decided to diversify into commercial business for a very different reason than Qualcomm. We
102 decided to do it because we thought we had to in order to survive. Back in the late '80s, the
103 defense budgets were in freefall. When peace broke out worldwide, defense spending
104 plummeted.

105 **WEST:** I remember real estate prices in San Diego plummeting. [Laughter] When all those
106 General Dynamics engineers got laid off.

107 **RAY:** That's right. General Dynamics went from 32,000 employees here to none. They did sell off
108 a piece of that business, but they had 32,000 at one time here in San Diego.

109 **SIMARD:** What commercial business did you get into at the time?

110 **RAY:** We were very fortunate when we started the company. Technology was communications
111 technology, defense communications, and then building a technology business. What do we mean
112 by "government technology business"? It's where the government gives you a R&D contract to do
113 research and development. You can take the technology that comes out of that to do whatever
114 you like. We had been getting R&D contracts for quite some time and had a very good technology

115 base.

116 **WEST:** When you say a "technology base," are you talking about intellectual property, which you
117 own, or are you talking about intellectual property which has been disclosed to the government,
118 but that you understand better than anybody? Are you talking about people? What do you mean
119 by "technology base"?

120 **RAY:** The contract from the government is to develop technology to build, build, build. The
121 government owns that technology. They paid for it. However, if you will put some of your own
122 money in, then you can take that technology and obtain a patent for it. In fact, you don't even
123 have to put your own money in. You can go get a patent. If it is strictly where the government
124 funded it, not where you funded it, then the patent will be such that you will have to give the
125 government use of that technology free, forever. But, you can take that technology that's
126 patented and go out commercially. The government encourages you to do that and sell it to
127 anyone you can, and you have a patent. So, the only thing you lose is that you can't use your
128 intellectual property that the government paid you to develop against the government. The
129 government has a right to that. But it really is not an impediment at all.

130 **WEST:** No. Here we're talking about communications when we're talking about the spinoff?

131 **RAY:** Yeah.

132 **WEST:** Or, the commercial?

133 **RAY:** No. It included communications.

134 **WEST:** What other technologies had commercial

135 **RAY:** We got involved in SPAWARs, as an example, and developed some ways of using electricity
136 to generate power that you could use to sterilize medical products, to kill bacteria in food, or to kill

137 bacteria that might be in the mail, like anthrax.

138 **SIMARD:** That's the SureBeam technology?

139 **RAY:** Yeah. SureBeam is one of those. We use it for other applications as well. That is one. But,
140 most of the technology was in the information technology area. Also artificial intelligence was
141 another technology area that we were on the forefront of.

142 **WEST:** IT is not known for the efficacy of its patents. Were there a lot of patents in the IT stuff or
143 was it more that people . . .

144 **RAY:** No. It was more the technology in the IT.

145 **WEST:** Like software or chip designs or what?

146 **RAY:** It was software and products. For example, we had a very, very early technology and
147 product for providing a system at very low cost to, for example, truckers. If you remember one of
148 Qualcomm's products was OmniTrack, and we debated on whether to compete with Irwin. I
149 remember us talking about it.

150 **WEST:** You and Irwin?

151 **RAY:** Yeah. Our technology was very different. It was called – god, what was it called? You're
152 probably aware that there are literally millions of particles that come into our atmosphere and
153 burn up daily, and as they burn up they leave a track of radiation coming into the atmosphere.
154 You can bounce radio signals off of those. It means that you can have low data rate
155 communications without having a satellite. Just use that as your satellite.

156 **SIMARD:** Wow. That's very creative.

157 **RAY:** It works, but it doesn't work continuously. You might go two, or three, or even five minutes

158 without communications. It is for an application that doesn't require continuous communication.
159 They like to provide information for truckers, and for information that can wait five minutes, you
160 can use this. We actually put in a few hundred devices around the country to measure the depth
161 of snow up in the mountains to see if there's going to be too much runoff. You put in sensors to
162 measure the depth of the snow, and then you use our system to transmit that back once a day to
163 someplace where they kept up with the snow depth. Then they could calculate what the likely the
164 runoff would be, and if there would be problems from the runoff in the spring.

165 **WEST:** It seems like that technology would be very useful in northern latitudes where you don't
166 have good satellite coverage?

167 **RAY:** But again, it's only limited. Today with satellites you wouldn't want to go back and use that
168 technology. But, that's the place where we did have intellectual property, we did have patents.
169 We decided not to pursue them. We sold it.

170 **WEST:** When did you sell it off?

171 **RAY:** We sold it to the people who created it, to the employees in house.

172 **WEST:** Did they do anything with it?

173 **RAY:** The last time I heard just a couple of years ago they were doing a small business. It was up
174 in the Seattle area.

175 **WEST:** That kind of brought us to one of our main questions. It seems as though Titan, much
176 more than most companies, has a formal—I don't know if "policy" is the right word—but it has a
177 habit or a process of spinning companies out. A lot of organizations say, "No, you can't leave," but
178 like you said to Meister, you say, "Bye-bye." Was it intentional or you just kind of happened upon
179 that?

180 **RAY:** No. It was intentional, and again I think it's from necessity. Defense companies around the
181 country have been uniformly unsuccessful in building commercial businesses. The principal reason
182 is that people managing those businesses don't really understand the industry into which they're
183 trying to get. You don't have people selling that product or service that really understand the
184 industry. They understand the defense industry or the government industry. The way I put it to
185 my people was, "How long would it take Microsoft's best salesperson to come into Titan and make
186 a sale to the CIA?" They said, "Forever." I said, "That's about how long it'll take you to go into this
187 commercial industry and make a sale. About the same length of time."

188 **WEST:** It's funny you should mention that, because I left my company over a dispute with my
189 boss. It was a little company called CACI. I don't know if you've heard of them?

190 **SIMARD:** I've heard of it.

191 **RAY:** It's not that little.

192 **WEST:** Yeah. My company never made it above fifteen employees. But I had a dispute with my
193 boss and I left. [Laugh] Of course, I didn't have a half a billion dollars in revenue when I left.
194 [Laugh] We actually made a commercial software company. I hear everything you're saying. The
195 biggest problem for us was the business models. We never actually escaped from the government
196 contracting business model. We went to a commercial contracting business model. But the
197 entrepreneurial business model is to take a venture capitalist's money, or angels' money, or
198 whatever, and to bet it, invest in a product, take the risk, put them all on double zero and see
199 what happens. The government contracting model is to make ten percent here, ten percent there,
200 ten percent over there.

201 **RAY:** That's one thing about management. You can't have the same manager doing both. The
202 mentality is, just as you said, totally different. If you're going to have a successful commercial

203 business, you have to bring in someone who has exactly that same mentality that you just
204 described. The entrepreneurial mentality. You put it all on goal and you go for it. That is a much
205 more expensive way to go than if you're using government funding to help to get it started, which
206 you could do. What we decided to do was to go out and find the very best person. Just like a VC
207 would do. Bring them in to run that business, then build a management team, and create a
208 culture that was appropriate for that industry, not the defense industry. But how does a small
209 defense company go out and find the best person to run this new business who would work for a
210 defense company? If that's all you are promising, you won't. You'll never recruit that person.
211 How do you recruit that person? The same way you do if you're starting up a company from
212 scratch. You set it up as a subsidiary with its own stock. You give that person a pocketful of stock
213 options, the same thing that that person will do to bring in people to work for him or her. You
214 build that up separately. It doesn't do any good to build that up unless there's a way to get them
215 acquitted. How do you get them acquitted? That's what brings you to have to spin it off. It
216 seemed to me that all of those things were necessary in order to get to our goals.

217 **WEST:** Essentially what you're saying is that the expectations and the demands of the executive
218 labor market for these sorts of entrepreneurial companies dictated your strategy for what you did
219 with these technologies?

220 **RAY:** Yes. You just go through what it takes to be successful. It really dictates things. Following
221 that route doesn't mean you're a successful company. But it's certain that if you use the same
222 people, no matter how bright or how smart they are in the defense area, to go over and build a
223 commercial business, it is very unlikely to happen, because they don't have the right mindset.
224 They don't understand the little ins and outs of the industry.

225 **SIMARD:** These came out from your efforts in the commercial realm, when you decided, "We

226 need to spin it off, because that's the best strategy"?

227 **RAY:** We really have to make that commitment very early on if we are to recruit those people.

228 Once you head down that path you can't...

229 **SIMARD:** Was that a strategy to make up for the lost revenue in defense? Do you still do that? If

230 you see some interesting company from somebody's organization?

231 **RAY:** No. We did that up until the technology bubble burst.

232 **WEST:** When did you start this?

233 **RAY:** We started it in the early '90s.

234 **WEST:** And stopped it when?

235 **RAY:** Two years ago. In early 2002. We probably should have stopped it in March of 2000.

236 [Laughter]

237 **WEST:** Yeah. Well, many people should have stopped.

238 **RAY:** We didn't quite have that good of an insight. [Laughter] The thing that really did help the

239 company is that we got recognized as a technology company in '98, '99. In '99 our stock was the

240 largest gainer on the New York Stock Exchange, and Qualcomm's was the largest gainer on the

241 NASDAQ that same year. We used the currency that we had through the price of our stock to

242 make a number of defense acquisitions. While our stock price was high, we bought a lot of

243 defense companies. After 9/11, when the defense budgets went up, we had the company sitting

244 in exactly the right position. We were just extremely lucky in how this company was positioned,

245 and the markets that it was positioned in. It allowed us to go after and win much larger contracts

246 very quickly and rapidly. During 2003, our core, internal growth was a little over twenty-nine

247 percent, over \$400 million in revenues. All internal growth. That strategy was paying off. We
248 would have never had the mass if we hadn't been recognized as a technology company and used
249 that to acquire other defense companies. We would have still been a \$150 million defense
250 company. We would have been going after \$10 million contracts instead of half a billion dollar
251 contracts.

252 **WEST:** Yeah. So using your currency?

253 **RAY:** Was fortunate.

254 **SIMARD:** You were reinvesting it in your core company?

255 **RAY:** Yes.

256 **WEST:** We were talking about the difficulty in transferring skills between the commercial side and
257 the business side for managers, but what about for engineers? Is it the same issue?

258 **RAY:** No. If you have a very good engineer, that good engineer can work just as easily on one side
259 as another. We transferred engineers all the time.

260 **WEST:** In both directions or just in one direction?

261 **RAY:** They go one direction at a time. Back in the late '90s, they were all going commercial. Now,
262 they're all coming back. [Laughter] They only go one way. They go both ways, but only one way
263 at a time. [Laugh]

264 **SIMARD:** Yeah. I've been looking at a lot of press releases from companies over time. A lot of
265 companies that were defense companies started claiming after the late '80s that, "We are a
266 communications company." Now, after September 11, they are back to, "We're a defense
267 company." It's the same.

268 **RAY:** I plead guilty. We worked incredibly hard in the late '90s to become known as a technology
269 company. We changed our logo. We said, "Our mission is to create, build, and launch technology
270 based businesses." Finally in '99 we became recognized as a technology company. That's why our
271 stock price went up so much. Then we went back. "We didn't mean that. We're really a defense
272 company." [Laughter]

273 **SIMARD:** You can be defense and still have very good technology and innovation? Yeah.

274 **RAY:** That's really true.

275 **SIMARD:** You can still hire the top engineers that really want to come back and want to still be
276 with a technology company? Right.

277 **RAY:** That is true. I was positioning us with respect to the markets.

278 **WEST:** All kidding aside, when we go back to look at what you said, I would hate to misrepresent.
279 It wasn't like you said, "We willed ourselves to be a technology company and then when it goes
280 soft, we'll run back"?

281 **RAY:** No. That wasn't it. That was not it at all. I was talking with tongue in cheek.

282 **WEST:** Yeah. I just wanted to make sure that we . . .

283 **RAY:** Yeah. Thank you, for that.

284 **WEST:** So, when you're transferring engineers back and forth, are you in fact acquiring
285 engineering talent in the local labor pool? Are you hiring them out of colleges or are you're hiring
286 them from elsewhere in the country?

287 **RAY:** Yes. Yes. Yes. All of those. After the first three quarters of 2003, we hired 3,200 new
288 employees. I don't know how many we hired the last quarter. I haven't heard that. But probably,

289 in all likelihood, we exceeded the 4,000 employees that we hired last year. We hired them from
290 everywhere. Everywhere you could get them.

291 **WEST:** How many of those were hired in San Diego?

292 **RAY:** I don't know that number.

293 **WEST:** How many people are here locally?

294 **RAY:** Twenty-five hundred or so? I don't know.

295 **WEST:** Is there any particular competence or expertise here in the San Diego operation?

296 **RAY:** Yes, there is. Let's get around to the real question that you asked before. Going back to
297 talking about why San Diego is so strong in telecommunications, I really do believe that the
298 principal reason for that is that Irwin Jacobs chose San Diego. Another thing that has helped
299 compliment it, as you were talking about it before, is UCSD. Although, most of Linkabit's early
300 recruits out of college didn't come from UCSD, many of them have come from there since then.
301 I'm sure Qualcomm has hired many. We've hired many. UCSD has been a very good asset, and a
302 very helpful asset. Another very helpful asset has been another thing you suggested earlier, the
303 military here. Since I first came here in 1970, the Navy has had a very strong presence here in San
304 Diego. They called it many different names.

305 **WEST:** NEL and NOSC?

306 **RAY:** You got it.

307 **WEST:** I won fifty bucks or a hundred bucks from NOSC in 1975 for their physics contest for high
308 school students. [Laugh] They had just renamed it from NEL. Because NEL was the people on the
309 top of the hill and NOSC was the people on the top of the hill, plus the people down on the side of

310 the hill. [Laugh]

311 **RAY:** You really do know this.

312 **WEST:** What I remember most is in '81 I went into a C-3 vault on the sea side, and it had to be
313 radiation tempest protected, because if there was a Soviet trawler offshore, they didn't want them
314 shooting microwaves at it to eavesdrop on their research. This computer that we were using was
315 inside this tempest-tested vault. I gathered from this visit that they were doing some sort of C-3
316 research for the Navy right in that part below the pill boxes for the Ft. Rosecrans bunkers. We
317 could talk... My dad worked for Convair during the war, but that would be maybe too far afield.
318 [Laugh]

319 **RAY:** No. That's right on. We have a facility just like that on the first floor of this building that you
320 can't listen into.

321 **SIMARD:** How much research does the Navy do here?

322 **RAY:** That has been here all along and it's been a very good source.

323 **SIMARD:** So, it's not just an outpost for sailors, like the image that . . .

324 **RAY:** No, it's not. About four years ago, I can't remember when, SPAWAR headquarters was
325 moved here.

326 **SIMARD:** Why did they move here?

327 **RAY:** I don't know. It was during the reorganizing of one of the base closures. It was part of the
328 consolidation. They actually moved here from Washington D.C.

329 **SIMARD:** Yeah. So, that was a big deal.

330 **WEST:** I interrupted you. You were starting to say, "Since 1970 there's been fairly active Navy
331 research here?"

332 **RAY:** There has been active Navy research.

333 **WEST:** Is there a theme or a pattern to it?

334 **RAY:** It's all been in the communications. Yeah. It's been Navy electronics, but it's really been
335 communications-driven technology that's been here.

336 **WEST:** If Titan is doing a defense contract, or SAIC, or one of the other contractors for Navy
337 communications, and they have an office here, then would the people who are doing the contract
338 work be also here generally?

339 **RAY:** Yes. Almost exclusively. We've had contracts for the Navy here in San Diego, whatever their
340 name was at the time, since we were less than a year old. So, it's been continuous for twenty-two
341 years now.

342 **WEST:** Do you have a sense as to what percent of the 2,500 employees are actually working for
343 local clients?

344 **RAY:** By far the majority, but I don't know.

345 **WEST:** Most of the local demand from the military is still communications, or is it kind of...

346 **RAY:** It still is. Yes. From the Navy. Even more so now that SPAWAR is up here.

347 **SIMARD:** Do you have a lot of defense contractors that open a branch here?

348 **RAY:** Yes. When SPAWAR moved out here a number of contractors did exactly that. The one that
349 made the biggest move out here, made the most overt efforts, and did well at it was Booz Allen.

350 But, the largest contractor here for the Navy has been for the last many, many years, SAIC, and I
351 think we're probably number two.

352 **WEST:** Is there other communications work or research centers for the Navy, besides San Diego?

353 **RAY:** This is the principal place for Navy communications. SPAWAR is the organization responsible
354 in the Navy for the communications and that was here.

355 **WEST:** Before SPAWAR moved here then there was some communications with NOSC?

356 **RAY:** Well, NOSC actually reported into SPAWAR. Yes, but it was still a part of SPAWAR.

357 **WEST:** So, from since you were here, most of the Navy's communications research has been...

358 **RAY:** No.

359 **WEST:** Was there another center besides San Diego?

360 **RAY:** It was in Washington, with SPAWAR, before SPAWAR moved out here.

361 **WEST:** So, the NEL was a branch office and there was a headquarters? Okay.

362 **RAY:** Exactly.

363 **WEST:** This is the thing that we're having trouble picking up. I made inferences. I said, "NEL was
364 here, NOSC is here, and then the Navy is here," but we haven't actually run into anybody who
365 could make the link, because most of the time we've been talking to people on the commercial
366 side. A lot of the Linkabit people we talked to didn't do local Navy contracts. They did D.C.
367 contracts, or maybe they did classified stuff that they wouldn't talk about. But, nobody really had
368 made the link between... Can you think of any other companies besides you and SAIC that have
369 benefited from the Navy's communication research here?

370 **RAY:** I know a lot of them here. Booz Allen, as I mentioned. I'm not even sure they were in San
371 Diego before SPAWAR moved out.

372 **WEST:** Well maybe going back a little further, though. Maybe ten years ago. Was anybody else?

373 **RAY:** A lot of them, yes. But a lot of the small companies have been acquired. There are a lot of
374 small companies that have sprung up that are doing that. I wouldn't be the best person to ask
375 that. We could get you a list of those companies if you'd like?

376 **WEST:** I'm just wondering if you would see these people in your bidding?

377 **RAY:** We do, but I'm no longer down seeing the bidding. We do see them. That's what I'm saying.
378 I could go to one of my people.

379 **WEST:** But, there's nobody of your size that's . . .

380 **RAY:** Uh, no. SAIC's the largest. I think we're probably next, but the big boys are all here as well.

381 **SIMARD:** Lockheed is here.

382 **RAY:** Lockheed. And DAE. They're all here. But, I think it's mostly the little guys that are here in
383 San Diego. SAIC is huge, certainly.

384 **WEST:** They'll do anything.

385 **RAY:** Yeah.

386 **WEST:** Does the fact that their operational units may be here matter at all, or is it just really the
387 research group that the linkage comes to?

388 **RAY:** No. The headquarters being here is very important.

389 **WEST:** Is it important that the fleet or the Seals, or the carrier wings are here?

390 **RAY:** No.

391 **WEST:** So, it's just the research side?

392 **RAY:** Yeah. Just the SPAWAR side. But it's more than research. SPAWAR actually produces the
393 communication products that go out in the field. You asked how large it was. Don't hold me to it,
394 but \$5 billion or \$6 billion per year rings in my head for SPAWAR.

395 **WEST:** Is there anything else we should understand about the linkages? Because we're trying to
396 understand... Irwin and Andrew do a little bit of government contracting, they build it up to
397 Linkabit, sell it off, do it again.

398 **RAY:** They do a little bit of government contracting, but then they use that technology that came
399 out of the government contracts to build all kinds of commercial activities. Let me give you two
400 wonderful examples that occurred after Irwin left. Irwin started Linkabit with Viterbi as a
401 consulting organization in '68, I believe. It was small for quite a while. In 1980, they sold it to M/A-
402 COM, and Irwin continued to run that business and some additional businesses within M/A-COM,
403 until they broke off in '85 to start Qualcomm. But, during that period of time they built two
404 commercial businesses that are humongous today. One is called satellites, the VSATs. They built a
405 commercial satellite communications business. They built the terminals. They built all of that
406 technology. They got all kinds of patents.

407 **WEST:** That ended up with Hughes?

408 **RAY:** That's correct. M/A-COM, in their infinite wisdom, back in the late '80s decided they were
409 going to get out of the commercial businesses and stay in defense, [Laugh] just before peace broke
410 out. They had all the patents and they sold that business in early '87, to Hughes, and that's where
411 the VSAT business came from. But, all those patents still are owned by Titan today, if they haven't

412 expired.

413 **WEST:** M/A-COM got the patents with Linkabit?

414 **RAY:** M/A-COM sold the business to Hughes. The intellectual property they jointly owned with
415 Hughes, and had a five-year period where they couldn't get in the commercial business. That was
416 in '87. When we bought Linkabit, we got the same intellectual property and we couldn't get into
417 the business using that intellectual property until 1992. Another business they built is a multi-
418 billion-dollar commercial business.

419 **WEST:** And you decided not to get into it when it expired?

420 **RAY:** No, we have gotten into it. We did. That's what led to our Titan Wireless. That was the
421 genesis for that. We used the technology that came out of that for two or three commercial
422 projects that we looked at and decided not to pursue.

423 **WEST:** So, Titan Wireless was the only thing that you commercialized from that packet of
424 technology?

425 **RAY:** Yes. That got up to \$200 or \$250 million dollars a year. Another wonderful technology that
426 Irwin built at Linkabit while it was owned by M/A-COM is something I'm sure you use quite often,
427 the ability to watch television over satellite. We've all used it. But, [Laugh] long story short, the
428 VSATs came along and they were using VSAT to receive television. Anyone could go out and buy a
429 big satellite dish and get NBC, ABC, because nothing was encrypted.

430 **SIMARD:** I think Martha Dennis mentioned they were also doing a scrambling technology. The
431 scrambling was from the military?

432 **RAY:** That's exactly right. They took that and turned it into a commercial business called
433 Conditional Access. What that means is that you can receive a program on condition that you pay

434 for it. It's called Conditional Access and it used scrambling, or encryption, as part of this whole
435 system. In September of 1986, after Irwin had left, M/A-COM again sold that business to General
436 Instruments, who are now owned by Motorola. Those are two very, very important and very
437 large commercial applications that Irwin built while he was doing defense business in Linkabit. We
438 also owned part of that technology.

439 **WEST:** Did you do anything with that technology?

440 **RAY:** Yes. We tried desperately, but General Instruments blocked it. As soon as the five years
441 were up, we jumped into the business and made a valiant attempt. We found out that General
442 Instruments was giving a kickback to HBO for [Laugh] every piece of equipment they sold, and we
443 could get every cable company signed up but HBO. Without HBO you didn't have a business.
444 There's more to that story, but there's no reason to get into it. It's one of the painful lessons. We
445 did try, but we were not successful. So Irwin was doing the defense business, but even then he
446 had the same model that he would have in Qualcomm, of using the defense as a base to build
447 commercial.

448 **WEST:** Does anybody else come to mind as someone who made that bridge from the defense side
449 to the commercial side?

450 **RAY:** Not like he did. No. There isn't anyone.

451 **WEST:** There's nobody like him anyway.

452 **RAY:** There's no one else like him. He's an incredible guy. He's an incredible person. He really is.

453 **WEST:** Any other sort of linkages or flows between defense contracts? Can you think of anything
454 else we should understand about how the military side of the San Diego electronics research
455 cluster works, or where it comes from, or how people go back and forth in knowledge?

456 **RAY:** If you go back and look at all the Linkabit spinoffs, there are dozens of them. If you go back
457 and look at all the SAIC spinoffs, I would say that there are two independent seeds that were
458 sown. One was Meister and the other was Irwin. Meister is the defense one. There are all kinds
459 of companies, I have no idea how many. I'm not sure there's a record of them.

460 **WEST:** The interesting thing is, though, we haven't seen a lot of impact of SAIC seeds on the
461 commercial side.

462 **RAY:** No. That's right.

463 **WEST:** Linkabit seeds seem more likely to create viable commercial companies than the SAIC
464 seeds?

465 **RAY:** Absolutely.

466 **WEST:** Any idea why?

467 **RAY:** Sure. It's the same thing that you said before, the problems you had when you left CACI,
468 when you still had the mindset of making ten percent and not taking risk. That's not the way you
469 build a commercial business. It's just not understanding that business.

470 **SIMARD:** Did they try spinning it off like your strategy, to hire the right culture?

471 **RAY:** No, I don't think so.

472 **SIMARD:** They wanted to have their cake and eat it too? And that just doesn't . . .

473 **RAY:** Yeah. You don't usually have your cake and eat it too. [Laugh] That's right.

474 **WEST:** So, if we see a spinoff by Titan then it's usually the case where you knew you had to
475 commercialize it, and you used this model you described to us, where you bring somebody in and

476 you try to build up the business and spinoff.

477 **RAY:** For spinoffs that's always the case. Yeah.

478 **WEST:** Have you ever divested a company where you've said, "Eh, we can't do anything with this.

479 We'll just kind of . . ."

480 **RAY:** Yeah. But, that's unusual. Rare. Very rare. I'm sure that it happened, but it's very, very

481 rare.

482 **WEST:** In most cases, when we see a spinoff then it would be something that was deliberately

483 intended to be built up?

484 **RAY:** Right. Let me give you another example of another area that we got into. This was

485 commercial IT. As I said, that's not intellectual property, that's really a service. We had been

486 doing IT on the defense side forever, so it just came naturally to do the same thing on the

487 commercial side.

488 **WEST:** You mentioned that Enterprise IT was one of your pillars. That's not strictly speaking of a

489 government line business?

490 **RAY:** That's right. One of the things that came out of that was we saw the need for a software

491 product that was tied right into the Internet. Again, we took the technology, we hired a CEO, and

492 then we went out and found venture capital money. I was already putting more money into Titan

493 Wireless and the SureBeam than I should have been. We went out and found a VC and set it up.

494 iPivot was the name on it. It was called something else before. But, iPivot was the name. We

495 built it up. It had total revenues of \$8 million in the fall of '99, and we sold it to Intel for half a

496 billion dollars.

497 **WEST:** Wow. [Laugh]

498 **SIMARD:** That's a good outcome.

499 **WEST:** What's it called now, do you know?

500 **RAY:** Oh, it's just part of Intel. It disappeared in there.

501 **WEST:** Do they have the product line, or did they just . . .

502 **RAY:** Yeah. They made a product out of it.

503 **SIMARD:** Did they stay in San Diego?

504 **RAY:** Yes. Yeah. Intel has a pretty sizeable operation here now. That was kind of the seed for
505 getting Intel consolidated here.

506 **WEST:** Is there anything we should understand about the Titan Wireless spinoff? Obviously it
507 didn't turn out the way you hoped?

508 **RAY:** That's right. It didn't.

509 **WEST:** But since that is the strongest link between the Titan story and our wireless story, I want to
510 make sure we're clear on that.

511 **RAY:** Yeah. The genesis that got us started into it was our VSAT business, the Linkabit technology.
512 We took them out of Linkabit and set them up as a separate wholly-owned subsidiary. We went
513 out looking for that CEO. We went to the commercial arm of Hughes and hired a gentleman that
514 had been the COO of Hughes Communications, which was their commercial arm at that time. Very
515 senior guy at Hughes. His name was Fred Judge, and Fred came in and ran that business for us for
516 the first few years. The first major contract we got was in Indonesia. Timing is everything in this
517 world. We got a contract. We put in a bunch of the VSATs there. They looked like they were
518 doing very well. We got a huge contract to expand it, and that was just about when the economy

519 in the Pacific Basin went into the toilet, which was in '94 or so, '94-'95. So, that business and that
520 contract didn't go for that reason. We regrouped and sold a number of VSATs around the world.
521 Then we moved from that into service and got to where we would use our capability to put in
522 VSATs as leverage to get into a country to provide services. We ended up being able to get a
523 worldwide network where we could use VSATs in countries where there was no fiber. You could
524 move into that country immediately. We used fiber where it was available. As a result we could
525 get low-cost way of providing service.

526 **WEST:** To governments or to businesses?

527 **RAY:** To businesses. Not to governments, but to businesses in the developing parts of the world
528 where there was no real telecommunications capability. It was a very good service. It held up
529 much longer than the telecommunication business did in the U.S., because there was such a
530 demand. But finally, it got caught up and went the way of... We thought it could outlast the
531 telecom depression in the U.S., but it couldn't. It finally got caught up. But, it was maybe a year
532 and a half, two years later, just because there was so much demand in those countries.

533 **SIMARD:** Had you already taken out all your stock options?

534 **RAY:** No. We were still fostering it. We had an IPO ready to go to spin that off when the whole
535 Pacific Rim turned down. We were ready to do it at that time. We had the prospectus prepared,
536 investment bankers onboard, very high valuation. I think it was three-quarters of a billion dollar
537 market cap evaluation on it. The technology bubble. [Laugh]

538 **SIMARD:** But, they managed to sell there, though?

539 **RAY:** Yes. By the way, one of the things I'm really proud of is that the country you may never
540 have heard of called Benin has one of the most modern telecommunication infrastructures in the

541 world. We put in a cellular telephone system across the whole country. We put in half a dozen or
542 so switches, and a fiber optic link. We came out of that making a reasonable amount of money,
543 and they ended up with a very flexible system.

544 **SIMARD:** So, you can help the Third World?

545 **RAY:** It really did. It really did.

546 **SIMARD:** Thank you very much.

547 **RAY:** Enjoyed it. Best of luck to you. Pleasure being here. It's nice seeing somebody that has so
548 much history on San Diego.

549 **END INTERVIEW**

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The San Diego Technology Archive (SDTA), an initiative of the UC San Diego Library, documents the history, formation, and evolution of the companies that formed the San Diego region's high-tech cluster, beginning in 1965. The SDTA captures the vision, strategic thinking, and recollections of key technology and business founders, entrepreneurs, academics, venture capitalists, early employees, and service providers, many of whom figured prominently in the development of San Diego's dynamic technology cluster. As these individuals articulate and comment on their contributions, innovations, and entrepreneurial trajectories, a rich living history emerges about the extraordinarily synergistic academic and commercial collaborations that distinguish the San Diego technology community.