



## **Hewlett Packard Software Workshop - Session 4: Business Growth of HP 3<sup>rd</sup> Party Software Companies**

Moderator:  
Burton Grad

Recorded: June 5, 2008  
Mountain View, California

CHM Reference number: X4698.2008

© 2008 Computer History Museum

## **Table of Contents**

GENTRY INC AND AMERICAN MANAGEMENT SYSTEMS.....	4
ABACUS AND URBAN SOFTWARE .....	5
PALO ALTO GROUP, QUASAR AND COGNOS.....	6
ADAGER.....	7
LARK COMPUTING.....	8
SMITH, DENNIS AND GAYLORD .....	9
WILD HARE COMPUTER SYSTEMS, INC.....	9
ACQUISITIONS IN THE MAINFRAME AND HP WORLDS .....	10
THE HP LEGACY .....	14

## **Hewlett Packard Software Workshop - Session 4: Business Growth of HP 3<sup>rd</sup> Party Software Companies**

**Conducted by Software Industry SIG – Oral History Project**

**Abstract:** Hewlett-Packard (HP) had a narrow but dynamic business marketplace in the 1970s through the 1990s, primarily based on the HP-3000 computer series and its successors. HP's commercial software offerings were complemented by software products and associated services from a small, active group of Independent Software Vendors (ISVs) and Value Added Resellers (VARs). This session discusses the growth of these ISVs and VARs and provides an insight into how these companies contributed to this part of HP's corporate history and the minicomputer history at large.

### **Participants:**

<b><u>Name</u></b>	<b><u>Affiliation</u></b>
Burt Grad	Moderator
Rick Bergquist	American Management Systems
Marty Browne	ASK Computers
Steve Cooper	American Management Systems
Jack Damm	Palo Alto Group, Quasar and Cognos
Steve Dennis	Smith, Dennis and Gaylord
Grace Gentry	Gentry Inc.
Martin Gorfinkel	Lark Computing
Chuck House	HP
Mark Klein	Abacus and Urban Software
Doug Mecham	INTEREX
Bruce Ray	Wild Hare Computing
Alfredo Rego	Adager
Phil Sakakihara	HP
Ron Seybold	HP, 3000 Newswire

Stan Sieler	HP, Allegro
Harper Thorpe	HP
Fred White	HP, Adager
Rene Woc	Adager
Doug Jerger	Software Industry SIG
Michael Adamson	Historian
Gerard Alberts	Historian
Glen Bugos	Historian
Michael Mahoney	Historian

**Burt Grad:** This is Session 4 of the HP Pioneer Software meeting. We're going to talk about the growth of the ISVs and VARs during the 1980s and 1990s and to the present. Some of the discussion will be about how the companies grew or didn't grow and how did the changes going on at HP affected their businesses. Grace, did you have any acquisitions or were you acquired?

### **Gentry Inc. and American Management Systems**

**Grace Gentry:** We had no acquisitions. We grew to \$20 million in revenue. It was a deliberate attempt to get ourselves into a situation where we would be attractive to a larger corporate buyer.

**Grad:** But you actually sold the professional services business not the products business.

**Gentry:** That's correct, because by then we had eliminated the products division and we had eliminated the OEM or the VAR division.

**Grad:** Did you do that because in most cases you get a higher price to revenue ratio on a products business than you do on a professional services business?

**Gentry:** No. That actually wasn't true at that time in history. Plus, the professional services division was very reliable. I mean it just went like this. We sold in 1998, okay. And the revenue curve was still climbing.

**Grad:** You were riding the Y2K curve which went in the opposite direction very shortly thereafter.

**Gentry:** That's right. At that time, professional services looked stronger, so that was the division that was the easiest and most profitable to sell.

**Grad:** To my knowledge, that was the only time in which professional services companies got a higher multiplier than products companies. They were typically sold at 50 percent of the annual revenues whereas products companies would get at least two times revenue or even higher. Go ahead, Steve.

**Steve Cooper:** Yes, we haven't been involved in any mergers or acquisitions in either direction. We've had partnerships through the years. But we're very much still in the HP 3000 business and the HP 9000 business as well.

**Grad:** Does the company still exist?

**Cooper:** This company certainly still exists. In fact, we're going to have our best year ever this year. We've committed to supporting our 3,000 customers for another 10 years. We're likely to be the ones that turn off the lights, I would imagine.

**Grad:** Number of employees?

**Cooper:** Ten.

**Grad:** Revenue? Do you want to disclose? You don't have to.

**Cooper:** Probably not.

**Grad:** Okay. We can multiply that by the revenue per person which we know from the ratio. <laughter>

### **Abacus and Urban Software**

**Mark Klein:** Neither acquisitions nor being acquired for either of the businesses I've been with. Abacus, I think, went out of business in 1981 or 1982. Orbitz is still around to this day.

**Grad:** A good sized company?

**Klein:** I really am not privy to the current state...

**Grad:** Any idea of the number of employees?

**Klein:** Probably -- well, I'm not sure. But I'm guessing 10 or less.

**Grad:** So it's a still a very small business?

**Klein:** Yes, it's gotten smaller. It grew in the 1990s and in the early 2000s fairly large. Well, larger <laughs>, from my perspective. And then since 2001, it's been shrinking.

### **Palo Alto Group, Quasar and Cognos**

**Jack Damm:** Well, as I said before, Cognos acquired us in 1982. I did some M&A work within Cognos, saved them from some really, really bad acquisitions by suggesting that they not acquire the companies. And this past March, Cognos was a billion dollar a year company. They got acquired by IBM for \$5 billion.

**Grad:** How much of their business was still related to the HP 3000 at that point? Do you have any idea?

**Damm:** No, I'm sorry, I could not tell you.

**Grad:** My guess is a small part.

**Damm:** Well, yes. I wrote the business plan for the business intelligence software. At the time, PowerHouse represented 100 to 150 million dollars in revenue back in the 1990 timeframe. Business intelligence really became the primary business of Cognos.

**Grad:** What platform is that running on?

**Damm:** Well, basically it runs on PCs but in some cases, the large databases are served by a host.

**Grad:** The host could be any platform?

**Damm:** Yes. I believe that there are multiple hosts. You know, the PC is connected to a network. It did not look that different from a bunch of terminals connected to an HP 3000.

**Ron Siebold:** Just to answer your question about how much of that business might have been related to the 3000. Burke and Foster, when he and I talked about this, he says, "It certainly has to be well under five percent or by law, they'd have to mention it in their annual report or one of their stock filings." Now, you know, it's probably a small fraction of five percent.

## Adager

**Grad:** Rene and Alfredo, any acquisitions or were you ever acquired? Either way? Does the business still exist?

**Alfredo Rego:** Actually, there is an anecdote. Remember, we were based in Guatemala. So there was this company called State Farm Insurance. None of you remember this. They wanted to buy something like 300 HP 3000s. But they needed Adager to maintain it later. So they did not want to deal with a Rin Tin company somewhere in Guatemala. So I got lots of pressure from HP. I guess in those days, Adager was really down there. And we were in Australia, actually. And my wife was there. And Ned Hayes was convincing my wife that I should sell Adager to HP. I said, "I'm not interested. I love Adager. I'm not in this to sell."

**Rene Woc:** I think you made a counter offer. Yeah?

**Rego:** I said, "Yes, maybe I'll buy HP." But anyway, in those days, Mark Hoff was the head of the worldwide support organization for it. And they had a big operation at a Mountain View Shopping Center, called Mayfield, big thing. So I remember that Mark Hoff who should have become HP's president, but he died of cancer unfortunately. A very sharp guy. He decided to come up with a really unusual solution. He said, "State Farm does not want HP to own Adager. State Farm wants HP to support Adager."

But let's just back up for just a second because you spoke of quality assurance here. There are two basic models for software support or maintenance or whatever you want to call that. We had the current, well-known Microsoft approach which has thousands of engineers standing by to answer questions. Back in 1978, I could not afford that. So I had to write a lot of if, then, else statements in my software. And since you come from the mainframe world, you know that there is a catalog of errors. If people get error message 255, you go and look in the catalog and that takes forever. So I could not afford that either. So I wrote very, very carefully. Maybe 50 percent of the Adager product is very specific error messages when the error happens, that tells you exactly what to do. So it does more of this space probe approach to software. I send my software out into the universe and it has to fend for itself.

So Mark Hoff knew that and he knew that Adager was extremely reliable thanks to a lot of work that went into it. So he said, "Alfredo, Adager support on the HP Corporate price list has a no charge option." And we signed a two page agreement, which I still keep. And that made State Farm happy. It made me happy. It made Mark Hoff happy. And that was the only attempt that I remember of someone trying to buy us. And that's how it was resolved.

**Grad:** That's a wonderful story.

**Rego:** Yes. And Mark Hoff was a good guy. He was a good guy.

### **Lark Computing**

**Grad:** Martin, anything on mergers or acquisitions?

**Martin Gorfinkel:** Well, the product in the ad from 1976 on was a word processing product. HP had a competing product on the boards. Something called Word 300, I think, that was supposed to come out a little later...and then was supposed to come out a little more later. And so they bought our software rather than sending their own out to market.

**Grad:** Did that put you out of business or what did you do?

**Gorfinkel:** Well, that paid royalties for five years, I believe, on the sales as well as they paid for support for the first two years when we were the HP lab. And we did things in a little bit differently than HP was used to in its labs because we had this notion that you should speak to the end user. So when somebody called with a problem, I got the SE on the line and told him to get the user on the line. And the three of us would talk about what happened. And that pissed off a lot of people. Not the SEs incidentally, who seemed to like it, but the other lab people who thought that this was going to filter back into HP labs or something.

**Grad:** Is your company still in existence today?

**Gorfinkel:** Yes, we moved from that to a photo type setting option and then to laser printers.

**Grad:** So you're still the current size?

**Gorfinkel:** Just me at the moment and not much of me. We've got a bunch of people still paying support and they get me with a cell phone or email. And that's it.

**Woc:** And what Martin doesn't know is, I actually was competing with him for that sale. I had just joined HP. I had a word processor, a similar kind of a concept. And I also offered it to HP. And I think it may have caused a one month delay in their deciding to buy his software <laughs>. But I didn't know it at the time.

**Gorfinkel:** You're right. I didn't know it either.



## Smith, Dennis and Gaylord

**Steve Dennis:** Yes, we did one acquisition in the agribusiness software arena, a company based actually in Fresno. But then we had split our company into two, SDG and SDG Healthcare. We sold SDG Healthcare in 1993. And I went to the acquiring company for a couple of years, and then came back to Smith, Dennis & Gaylord. And in 1997, we merged Smith, Dennis & Gaylord with Solomon Software and did a lot of acquisitions based upon the strength of our two companies and then sold our company to Great Plains Software in 2000. It was then acquired by Microsoft soon thereafter.

**Grad:** We have an interview with Harps

**Dennis:** Oh, Gary Harps. Yes.

**Grad:** We did that a couple years ago; give him my regards. He is a fine man.

**Grad:** Let's go ahead. Rick?

**Rick Berquist:** No acquisitions or mergers. I am software developer. I moved onto a start-up to catch the next wave of growth

**Grad:** Now AMS, they were bought by somebody or are they still independent?

**Berquist:** Yes, AMS was bought out about two years ago, I think.

**Cooper:** I think a little more like three or four by a Canadian consulting firm. Three letters...I want to say CGI. Does that sound right?

**Grad:** I do remember the company that you're talking about. But your business was not a major part of that sale, I assume.

**Berquist:** No.

## Wild Hare Computer Systems, Inc.

**Grad:** And you're still independent in your operation, Bruce?

**Bruce Ray:** Right.

**Grad:** No one's been offering to buy you yet?

**Ray:** We have not accepted any offers yet.

**Grad:** Did anything change -- now, we get into the 1980's and to the 1990's. Did any of you start to sell hardware that didn't sell hardware before? Did some of you drop selling hardware that had sold before? Did anything change dramatically in terms of the packaging, your service offerings, anything like that? Go ahead.

**Woc:** There was one point in time where we sold DLT devices for the 3000. We bundled it with our back-up product. This was prior to the time that HP actually offered them on the platform. And it was successful for a couple of years and then we realized we didn't want to be in the hardware business.

**Grad:** Any others where there was a significant change in whether you became a VAR or didn't become a VAR? I guess not much there. Yes, go ahead.

**Ray:** From a multi-vendor standpoint, we found that the Spectrum, the 9000 series, was much more competitive than the 3000 especially in Europe. So once the transition mentally and physically within HP occurred, HP was more aggressive with the 9000. And there were actually more sales in Europe than in the United States. And HP won out over competing vendors like Data General who had similar offers.

**Grad:** Did some new companies come into this marketplace in the 3000 world during the late 1980s and 1990s or were they pretty much the same ones that had been there earlier?

**Woc:** Some new companies surfaced. Some of them were just put together from older companies. I'm thinking about Screen Jet which in particular made a rise in the 3000 marketplace. They still exist today. And there have been others.

### **Acquisitions in the Mainframe and HP Worlds**

**Grad:** I guess one of the things that surprises me is that in the mainframe world, Computer Associates became the repository. Every system software company ended up being bought by Computer Associates essentially. We figured out one time that they represented the collection of over 10,000 separate companies that eventually were acquired through a series of steps, you know. Sterling Software bought some. Platinum bought 100 and on and on and on to make up this 10,000. I don't see any place here -- Cognos a little bit. But I saw no one accumulating all of these companies anywhere. Is that a wrong or right thing?

**Woc:** Okay. Now, we have to talk about the Man-Man stories because Man-Man winds up being a great example of mergers and acquisitions. But by the time it becomes Man-Man, ASK is long out of the picture. You can go to a website called ERP Graveyard in order to find out how all these ERP systems wind up being acquired over and over again. And Infor is the company that's wound up acquiring most of the ERP systems. But Man-Man went through around five acquisitions before it became part of the Infor. I mean, it was acquired by Computer Associates and then by a number of other companies. So I would say as far as consolidation goes, what you seem to be addressing is really the ERP systems, For example, one of the ERP solutions is one that HP built called MM2. And eventually MM2 gets purchased by a group of people who were with HP. And they run it for themselves and call it Xogesis. And then they wind up selling it off to another company, RP Solutions. And then they get purchased by Speedware and then Speedware gets purchased by Activant. Well, the thing about it is with each of these acquisitions, the people who knew the 3000 fall farther off of the chain or disappear completely.

**Grad:** ASK did a number of acquisitions. Did they buy Informix?

**Cooper:** No. Ingres.

**Woc:** No, CA bought Ingres.

**Gorfinkel:** No, no. ASK bought Ingres and then CA bought both.

**Grad:** ASK became a different size company and changed character. And then Sandy Kurtzig comes back to the company and it's a different ball game, I guess. I don't know what happened much after that, but I guess I'll find out when I interview Marty Browne tomorrow.

**Cooper:** Well, I can tell you what happened to Ingres on the 3000 because after the CA acquisition, when most of the employees left in droves and did some damage on their way out, they hired us to maintain Ingres on the 3000. And we struggled for quite a while because the entire development environment was missing. And we eventually got the next release out but by then it was too late.

**Grad:** That's a sad story.

**Gentry:** My daughter was at Ingres when ASK acquired it. And she said that ASK came in with such arrogance that the Ingres staff took umbrage and took an exit. It all came off of the attitude that ASK came in with.

**Grad:** Computer Associates, of course, in their purchases told you that they were going to get rid of 75 to 80 percent of the people who were there. And their plan was to live off the maintenance revenue. I don't know if that was the plan when these other products were acquired or not. I have no idea. I don't know if your maintenance streams were big enough, with enough dollars to make it interesting to them.

**Woc:** Well, one of the larger software vendors in terms of the number of seats that were in HP 3000 sites was a company called WRQ or Walker Richer and Quinn.

**Grad:** We tried to get them to come here also.

**Woc:** Well, you know, they have been taken over as well and the merger happened between them and someone who was a rival. So I don't know if this other company, Attachmate, but it had tried to be in the 3000 business for a long time. And it made much more of a splash in the IBM world. I'm not sure whether they count as a new supplier or not. They couldn't make KEA work or gain any significant market share in the 3000 space. But I mean they're also a story that speaks back to this contention within HP. And it came and it went according to Doug Walker. When I talked to him as he left the company, he said, "Some years it was good. Some years it was not so good."

**Grad:** Well, let's address the comment that the relationships were fundamentally supportive. There were certainly periods where it was up and down in terms of the nature and level of the relationship between HP and the current companies. In any case, it appears that the products sort of never die. Is that a fair statement? You have an exception to the financial thing where at some point, no one does financial analysis except on the PC, right?

**Cooper:** Yes, as far as I know, Cognos actually sold it off along with their GL because there were things that it could do that you still can't do on the PC. But I personally have completely lost track of it. I have no idea. My favorite line is "We'll be off the platform in six months."

**Cooper:** I hear it all the time. And everything's so good, I got a client for the next four or five years. Yes, in the November 14, 2001 announcement, HP said we're going drop all support at the end of 2006. So we announced we're going to support through 2016, which in my mind is infinity. But around about 2003, 2004, we'd be getting calls from clients wanting to know if 2016 is a hard deadline or might we consider working and supporting the platform beyond that.

**Grad:** Any of you ever do a real forecast on how many sales you're going to make and price based upon what your forecasts were? Did any of you ever do that? What was your sales horizon? How far out did you think you might sell or have maintenance?

**Cooper:** We usually looked five years out. I mean our board demanded that we look five years out.

**Grad:** That five year period seems to be a locked period. And we did that for valuations and so forth. Five years. And we see products still being used for 20, 30, 40 years. Unbelievable. Ron?

**Ron Seybold:** Well, everybody says when you ask them we are migrating or we're in the process of migrating because it's the safe thing to say. Otherwise, you're looked at as some kind of a dinosaur. But in truth, everybody talks about business logic and business practices and things that are wired, even software that you buy off the rack and you don't modify. And I mean this comes as a fundamental. This is why nothing dies because people hate change. I talked to somebody just the other day. She says, "Yes, we've created a new system. It's wonderful. It runs on Oracle. It's web-based." And the users are still clinging to the 3000 system.

**Michael Adamson:** Just to respond to your query about Computer Associates not buying any of these companies because they weren't big enough. The company for which I worked before I went back to graduate school -- four years after I went back to graduate school -- was purchased by Computer Associates. And I think the sales of the company at that time were about 100 to 120 million dollars.

**Grad:** Computer Associates bought some smaller companies. That wasn't what I was saying. Because CA bought companies as small as four or five million dollars a year in sales. I once sat in on a courtroom with Charles Wang for close to a week. He was suing a company that had about \$2 million a year sales and CA was something over \$2 billion at that time. And he sat there personally watching the testimony every single day. They were the most litigious company to my knowledge in the industry. As of 10, 15 years ago they had over 400 or 500 lawsuits. And conversely, one of their principals is sitting in jail, I guess, at this point.

**Seybold:** I said, "Don't you love the law?" with Karma police.

**Grad:** I am trying to bring things as much up to date as we can. So nothing much has changed here. Many of you are doing the same kinds of things. You seem to be the only one who really migrated yourself.

**Dennis:** Yes and no. I love Woody Allen's line who said, you know, as he became more famous, he just struck out with a better class of woman. Basically, you know, the story is the same. The players change. The technology changes. But as I look back, our very first client was Wilsey & Hamm, a professional engineering firm, and we built a custom system for them on GE timesharing in the area of project accounting, which we then migrated to Basic 4, which

we then migrated to the HP 3000, which we then migrated to Tandem, which we then migrated to become PC based. And it is now the world leader for Microsoft in that area. But the business problem is identical from back in 1973 to 2008. So the only thing that's changed -- although we only talked about the HP 3000 slice of it -- the only thing that's changed is the way the screens look and the business process -- the problem of managing a project hasn't changed.

**Grad:** That's a real interesting point. I guess what I was looking for was trying to get a picture of the number of companies that became large, building out of the HP 3000 space.

**Woc:** Building away from HP?

**Grad:** How many started here and then become big someplace else.

**Woc:** Primarily Walker, Richer and Quinn comes to mind because they built out on two other platforms.

**Grad:** Were there half a dozen? Name them. Who got us started in this space?

**Seybold:** Cognos. Quest

**Dennis:** Computer Solutions, which wound up being a part of Sybase.

**Grad:** Okay, good. Who else? Certainly ASK was in that category, a big company.

### **The HP Legacy**

**Cooper:** Well, I just wanted to say that I think there are other things that have permeated the industry. I think the HP way is alive and well. It may not live at HP anymore but it lives in a lot of our companies.

**Grad:** How do you define it?

**Gentry:** Honest, upright and clean.

**Cooper:** A commitment to excellence and protecting your customers' investment.

**Chuck House:** Well, I think there's a strong compliment. Let me give one quick example. There's a museum exhibit over in Los Altos right now that's been running for a few months, about Dave and Lucille Packard. There's a series of three letters written in 1963 in the

collection. One was a lawyer writing to Packard to say, "We've discovered that for your new purchase, you could file for an agricultural exemption on your property, 33 acres." He writes back and says, "My wife and I have talked about this and we think those taxes go to the local school. And we want to carry our fair share." The lawyer writes back and says, "The county assessor says he's never heard of anything like this, but he thanks you." Okay? This went on display about two months before Larry Ellison goes in and says, "My property ought to be revalued." And he was basically granted a \$3.2 million exemption for taxes because his place cost 170 million dollars and couldn't be sold for that these days. So they're now running a special bond issued for Woodside and Bortolo Valley to try to figure out how to pay the teachers this year because Ellison wanted to cheat on the taxes or whatever you want to call it. That's what I take it to mean, ethical and upright and upstanding among other things. But HP executives wouldn't tell a lie to the customers at least back then.

**Gentry:** No. As I've said, one of the reasons we were comfortable with HP is because of the salesmen for some of the other companies, which will remain unnamed, they would never ask us to lie but they would ask us not to reveal information that we thought the customer should know as part of the purchasing process, etcetera. And I never felt HP would even dream of asking us to do that.

**Grad:** The act of omission rather than commission, I would think. That's still bad. Yes?

**Gorfinkel:** They were extraordinarily straightforward. When I met with David Packard personally, I was amazed at the stories he told me that I thought were just amazing. He said, "I just came back from China working for the State Department kind of thing." It made me feel so comfortable that it was an amazing interface with this person. And that pervades the whole issue of users and how they treated them and how they felt about their employees.

**Stan Sieler:** When we sold the word processing package to HP, we were getting monthly rent checks during the first year or so. About a week before the check was due, we'd get a call from accounting saying, "We've got the check. I'm not sure it'll get to you in time if we put it in the mail. Would you mind if we hand delivered it?" By the end of the period, some years later, we'd be calling them because the check was a week, two weeks, three weeks overdue and nobody really cared. And that seemed to be the passing of the HP way within HP.

**Rego:** Yes, this had to do with the unbundling of Image event by HP in 1990. I love to ski as Chuck House knows. And I used to ski in Alta. So, I would meet Bill Hewitt at the Alta Lodge back in, well a long time ago. He even fell down once in Alta and broke things, remember?

**House:** He wasn't a real good skier.

**Rego:** Yes, that was a great spot by the way, in Alta. But anyway, I wrote to Bill and I said, "Bill, hey, I'm sorry to write you about a business issue but this is really serious." So then he said, "Well, I'll pass this on to John Young." But John was not too interested. So then I went back to Bill and I said, "Maybe you and Dave can get together with this and just discuss it." So Dave called the others and then we talked about that. And I don't know whether they called John Young but eventually Image was not unbundled. So these guys, who are very high level, were very interested and very important. And they asked me what the consequences would be of unbundling versus not unbundling. So I basically told them what Steve told all of us, that this was a unique thing in the industry and that they would really grow a golden opportunity by not doing that. So who knows what happened but they made it happen.

**Grad:** And one final comment and then we'll take our break.

**Dennis:** Yes, I just wanted to tell a story about David Packard and integrity. We had been selected by New York City Health & Hospitals, the 11 big hospitals in New York, Bellevue and Metropolitan, all the thousand bed hospitals, for 11 HP 3000s and 11 copies of our healthcare software. And we got to signing contracts and one of the things we had to sign was the fact that we didn't do business in South Africa. And I was happy to sign that since we didn't do any business in South Africa. But DEC challenged it because HP did do business in South Africa. And the City of New York said, "We're very sorry but because even though we were buying this hardware from you, because of HP's policy in South Africa, we can't do business with you." You can imagine how we felt since this was the biggest contract in our history...it was quite a disappointment. So we contacted John Young to talk about HP's policy in South Africa. And I got a phone call that David Packard wanted to meet with me. So, this was the first time I had an opportunity to meet with him. I came into his office and he explained to me why HP was in South Africa and why they were employing local South African people, why it was the right thing for their country. And soon thereafter, there was a shareholder's meeting and HP pulled out of South Africa. I don't think it had anything to do with our conversation. And we were awarded the contract after a short legal battle. But the fact that he would take the time to do that and explain the logic to me, I thought was very nice.

**Grad:** Impressive. We'll take a 15 minute break. We'll reconvene at 4 o'clock here and we'll do our final session at that time. Thank you very much.