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Maintaining an Edge at ADI (A)

Jerry Fishman, chief executive officer of Analog Devices, Inc. (ADI), grimaced inwardly and accepted the disappointment. One of the largest cellular handset makers in the world would not be using ADI components in its next-generation cellular handset.

ADI had been trying for several years to break into the top tier of the cellular handset market. The ubiquitous devices were full of cutting-edge electronics, and ADI had strengths across the board. Cellular handsets were one of the largest and fastest-growing applications for ADI's products.

ADI believed it held the technical high ground, even over much larger rival Texas Instruments (TI). The company boasted an extraordinary new digital signal processor, dubbed Blackfin, that could have been the keystone component in its prospective customer's best handset to date. Had ADI made the sale, it would have multiplied sales in several of its product lines; but it was not to be, at least, not this year.

Mr. Fishman wrestled with his instincts. There were plenty of reasons to remain optimistic. Feedback from the prospective customer suggested that Blackfin did indeed have the requisite technological muscle. Furthermore, Mr. Fishman knew that decision making in large organizations was complex and politicized. It would be easy to read too much into one piece of disappointing news. And, throughout his three-decade career at ADI, he had seen that innovations such as Blackfin required patience and persistence. At the same time, breaking into the cellular handset market was proving to be a daunting challenge.

Mr. Fishman also felt a growing anxiety that something more fundamental was amiss at ADI. It was becoming clear that winning in the marketplace demanded more than just technological superiority at the component level. More and more frequently, customers expected help in designing complete systems. In fact, some handset providers (though not the largest) were so driven by sales and marketing that they expected to limit their manufacturing to little more than attaching a plastic casing with some branding.

ADI simply wasn't organized for systems design. Since its founding, the company had competed on the basis of product superiority at the component level. To put together full systems for customers, ADI managers had to work across organizational boundaries. Doing so was slow, inefficient, and often ad hoc.

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Mr. Fishman glanced at his calendar. The subject of his next conversation was the global celebration of ADI's 40th anniversary. It presented an opportunity to take great pride in ADI's many accomplishments, among them embedding motion sensors inside silicon chips, a technology that had revolutionized automotive airbag systems. But, Mr. Fishman wondered, was ADI's advancing age also cause for concern? How long could any company remain on the cutting edge? Was ADI due for its first major organizational reshuffling? Could a major change create system-level strengths without destroying the company's existing world-class capabilities at the component level?

Signal-Processing Technology

Driving west through featureless eastern Colorado on Interstate 70, John Nakamura was jolted from semiconsciousness by a police car that was just coming onto the highway. He checked the digital speedometer on his dashboard and slowed a bit. The police presence passed uneventfully.

Glancing in the rearview mirror, Mr. Nakamura mentally took stock of his children in the back seat. His 7-year-old was entranced by a Harry Potter movie on a portable DVD player. His 4-year-old was happily learning the alphabet with a talking spelling toy. And his 2-year-old, sleeping, clutched a plastic monkey that giggled when squeezed.

Mr. Nakamura's thoughts drifted to the exciting days of his early career. After completing a double major in applied mathematics and electrical engineering at one of the world's most prestigious institutions of technology, he had joined a team working on the next breakthrough in submarine sonar systems for the United States Navy. It was the height of the cold war, and Mr. Nakamura found himself working with a select group of the world's best technologists.

Sonar systems detected sound from hundreds of hydrophones both fixed to the hull of a submarine and towed behind it. From that rich and complex stream of acoustic energy, a small sonar team of three to six, with the substantial help of technology, identified that tiny fraction of information that was meaningful and important and passed it on to the ship's captain.

Certain aspects of the task—for example, discerning signature sounds from specific kinds of vessels—could only be accomplished by humans. But the captain's need for *real time* information, about what else was in the water and where, necessitated that most of the work be tackled by machine. It had been, in Mr. Nakamura's view, the ultimate signal-processing challenge.

Because of the real-time nature of the task, traditional microprocessors, at the heart of today's personal computers, were inappropriate. Microprocessors were optimized for high-speed sequential data processing, not real-time processing, and that difference mandated fundamental design differences at the level of circuits etched in silicon. When Mr. Nakamura's system was complete, the sonar teams could work from numerous

complex displays that indicated the direction, intensity, and frequency of the sounds all around them in a myriad of custom formats for a wide variety of situations.

Through the 1980s, engineers employed signal-processing technologies, primarily in military and industrial applications. Most any information interface between the real world and a machine involved signal processing. The *signal* could be any of several real-world phenomena, such as motion, temperature, pressure, sound, or light. The *processing* task is one of translating data from signal detectors into something useful for humans—for example, a moving needle on a thermometer. A critical signal-processing step is *amplifying* weak signals from sensors so that they are strong enough to drive the movement of an instrument. If signals were to be used instead as inputs to computing systems, they also had to be *converted* from analog signals to digital signals. (Some devices, like the learning-to-spell toy that entertained Mr. Nakamura's child, required the reverse process: converting a digital signal to an analog one and then amplifying it so that, say, it could create sound in a speaker.) Mr. Nakamura, who was thoroughly familiar with ADI's offerings, knew that amplifiers and converters were the two foundational product categories from ADI's earliest days.

Mr. Nakamura was on vacation from his current job with a company world famous for its high-fidelity audio equipment. He was leading a product development effort for a new home entertainment system that would add computer networking technology to high-fidelity audio equipment.

He noticed that his wife, seated next to him, was reviewing the photos they had taken the previous day with their digital camera, a device full of both analog and digital signal processors. In fact, every person in the car was holding something that contained signal processors. There were also dozens embedded in the automobile itself (even more in the police car) and another collection in Mr. Nakamura's laptop and cellular phone. Signal-processing technology had truly come to the masses.

Mr. Nakamura could no longer pretend that the fate of the free world depended on his work, but he was still thrilled by it.

Financial Models

Joe McDonough, ADI's CFO, prepared for another conversation with Wall Street analysts. He knew the questions they would ask. He well understood how they analyzed ADI. And he knew his answers would never leave them fully satisfied.

For its first 25 years—1965 through 1990—ADI competed almost entirely within the analog segment of the semiconductor industry. Though the segment was puny compared to the microprocessor segment that Intel dominated, it was lucrative. Built on a foundation of world-class R&D and manufacturing, ADI had consistently delivered gross margins of 50 percent or better, operating margins of 30 percent or better, and growth in excess of 20 percent. Shareholders were pleased.

By 1990, however, ADI had made a firm commitment to diversify and had begun escalating its investments in the rapidly emerging field of digital signal processing (DSP). Though such a move was risky and expensive, ADI's leadership team believed the evolution of the semiconductor industry made building a DSP capability mandatory for two reasons. First, they believed companies in the semiconductor industry would continue to squeeze more and more functionality onto single chips. Doing so made end products faster and cheaper. Digital and analog functionality would likely end up on single chips, and the lines between analog and digital markets would blur. Companies with one-dimensional capabilities would weaken or even fail. Second, as digital technology advanced, customers seeking to enhance the functionality of their products or reduce costs would replace tasks that traditionally were analog with digital designs. Digital posed a direct threat to analog.

ADI competed directly with Maxim Integrated Products and Linear Technology. Both competitors chose not to diversify, maintaining a pure focus on a single competence—analog signal processing. By 2005, ADI's hypothesis about market evolution appeared to be directionally correct but exaggerated. There indeed had been some convergence in markets and a decline in the growth rate of the analog segment. Nonetheless, the profitability of the analog segment remained staggeringly high.

Therein lay the problem for Mr. McDonough. ADI's investments in DSP technologies were long-term investments with volatile results. As such, DSP dragged down ADI's performance. Meanwhile, analysts fixated on ADI's pure-play competitors, Maxim and Linear Tech, which were strong performers. "Why can't you match their margins?" was their incessant refrain.

Mr. McDonough sympathized with the analysts' viewpoint. Cumulatively, investments in DSP at ADI had yet to break even. Only in the best of times did DSP margins approach those of the analog business. To consistently reach the performance standards set by the analog segment, the DSP business would have to operate at a much larger scale to amortize the much larger costs of developing each product. ADI's arch rival in the DSP market, TI, operated at that higher scale. It had won the big contract that ADI had lost and was way out in front of ADI with handset manufacturers. Cellular handsets were by far the largest end-use application for DSPs.

While ADI could have broken out the profitability of DSP and analog separately to show analysts that the company's performance in the analog segment was still strong, it chose not to. Doing so would have made it difficult to reorganize because any reorganization would make it impossible for analysts to make clear year-on-year comparisons.

Mr. McDonough and Mr. Fishman periodically engaged in conversations about the possibility of spinning off the DSP business, but such discussions never got far. The pair settled on the viewpoint that the DSP business was strategically critical and a future driver of growth.

The Nature of the DSP Game

Brian McAloon, who headed the DSP business for ADI and reported directly to Jerry Fishman, reviewed the upcoming year's preliminary budgets, submitted by his product-line directors. As usual, there was a lot of desire for additional new investments to drive the DSP business forward, investments that would be thoughtfully and thoroughly questioned by Mr. Fishman, Mr. McDonough, and others.

There were requests for new hires across the board—not just for hardware developers, but for software developers, systems engineers, development tool designers, and field applications engineers (FAEs, who worked directly with customers on product designs.) It was complex, and for a moment Mr. McAloon entertained recollections of simpler days, when he was "a pure analog guy."

The entire company had been much simpler 20 years before, in the 1980s. Back then, ADI had a functional organizational design, with heads of sales, manufacturing, and R&D, along with general managers of product lines, who were responsible for product management and marketing and were measured on profitability by product. (See Figure 1.)

ADI's strategy was simple: "Build the best and customers will come." ADI's first priority was always to retain the technical high ground. It did so through superiority in product design and excellence in manufacturing-process design. There was greater opportunity for differentiation in manufacturing-process excellence in analog semiconductors than there was in digital. Analog signals can be noisy, clean, or anywhere in between, as any aficionado of stereo equipment will recognize. By contrast, the quality of a digital chip is essentially binary; either it works or it does not.

ADI developed hundreds of new products each year, mostly minor variations on existing amplifiers and converters. Research and development costs of each product were small, often less than $1 million. ADI's customers, sometimes with some assistance from ADI's sales force, were able to find the component that met their needs and simply plug it into the product they were designing.

By 2005, ADI's sales of analog components had reached $2 billion and sales of DSPs had grown to $600 million. ADI had learned that the DSP business was different along a number of dimensions. Developing a new DSP was much more expensive, for example. The hardware development cost alone could run as high as $50 million.

Selling DSPs was also distinct from selling analog components, though there was a small subset of customers who bought DSPs in the way that ADI was accustomed. That is, if the performance was high, the customers bought the component and plugged it into their products. In 2005, ADI had hundreds of small DSP customers of this description across many industries. Collectively, ADI referred to these customers as the company's "horizontal" market. However, in the DSP market, quite unlike the analog market, the "vertical" segment was much larger, consisting of a small number of large customers in a

select group of industries, focused on specific applications, such as cellular handsets and broadband modems.

For these customers, the off-the-shelf DSP was of little use. They expected customized hardware (e.g., variations on the core Blackfin design) and more. For example, ADI offered development tools (software for software programmers) for customizing DSPs for specific applications. (DSPs, unlike analog processors, were programmable.) The easier the development environment and the greater the help available to product developers, the more likely the customer adopted the DSP. In addition, ADI provided ready-to-install software for specific DSP tasks and options for peripheral functionality, such as memory or an external interface device. To bulk up ADI's skills in these areas, the company had acquired two small firms, one focused on DSP development tools and the other focused on DSP software.

Beyond tools and software, ADI engineers worked side by side with their customers' development teams—at no cost to the customers—to accelerate product design. In fact, in order to best assist its customers, ADI built deep expertise in certain end-user applications. To compete in the cellular handset market, for example, ADI's FAEs needed to know everything about how handsets worked and everything about how the cellular industry competed. ADI's non-hardware activities amounted to approximately 30 percent of total development costs.

Complicating matters further, the sales cycle for DSPs was long and complex. Customers were not just buying a component that performed well and met specifications. They were buying a foundational piece of an overall system, one that not only would send their product development efforts down a specific path from which they could not return, but would require a subsequent commitment to learning a set of nontransferable skills and developing software modules that were tied to a proprietary DSP. These were high-level decisions, often made by lead engineers, sometimes even by CEOs. To succeed at this level, ADI had to think not just about building the best processors, but about making its customers winners in their own businesses. Often, customer success depended more on time-to-market than product performance.

Mr. McAloon studied the budget, trying to balance resources and opportunities and striving for the model levels of operating profit set by the analog division. It was not getting any easier to predict how much of which kinds of resources would be needed—or when they would be needed—to succeed. In addition, ADI's customers were in the fastest-changing industries in the world, like cellular handsets. The DSP business was risky, and managing it still required a lot of guesswork.

Executing the Systems Sale

Vince Roche, ADI's head of worldwide sales, was pleased with the first part of the meeting. A group of salespeople, FAEs, engineers, and business leaders from multiple business units were developing a plan to meet the needs of a major manufacturer of digital

cameras. It was an exciting opportunity that was only now emerging. Nonetheless, just negotiating calendars to make the meeting happen had proven tricky.

The customer had shared plans with ADI about not only an upcoming product launch, but preliminary designs for the next two product generations. ADI's ability to help the customer advance its market position could mean a marked bump in ADI's sales for several years to come.

The salespeople had started the meeting by describing the specific customer needs they had uncovered in recent conversations. The leader of the digital camera business unit also spoke, elaborating on the business conditions the customer faced and describing what the customer likely needed to achieve in order to win in its own market. The FAEs, also part of Mr. Roche's sales organization, then gave a systems-level overview of the current camera design. Finally, attention turned to the product designers attending the meeting, and they engaged the group in a debate about the wide range of possible solutions for the customer, making the most of ADI's leading-edge components.

ADI's sales force historically had been the primary conduit for transmitting information about customer needs to product designers. As customers began seeking much more than just components from ADI, however, input from FAEs and business leaders became increasingly important to validate and expand upon the input from the sales force. ADI and its customers valued interactions at the systems-engineering and business-leadership levels. At the same time, such interaction added expense to ADI's sales and development processes and multiplied the demands on the company's business leaders' time.

There was no way to develop a digital camera solution without involving multiple ADI business units. Digital cameras required multiple signal-processing steps, both digital and analog. ADI's analog and DSP divisions each consisted of more than a dozen business units. Some were "horizontal" and product focused, while others were "vertical" and application focused. The vertical units drew on the horizontal ones for components and component-level expertise and then added additional value—sometimes through custom component design, sometimes through overall system design, and sometimes by adding software or peripherals. The vertical business unit that focused on cameras represented the biggest presence in the meeting. (See Figure 2.)

As ADI expanded the number of business units, it maintained a centralized sales force, much like many of its competitors. There were about 500 salespeople and FAEs who called primarily on the biggest 200 to 500 of ADI's 50,000 customers. (The remaining sales were made through catalogs or the Internet.) Salespeople represented ADI's entire portfolio of products and technologies and also provided supply chain services. FAEs had more specialized areas of expertise and partnered with customers to tackle engineering challenges. Over time, as ADI consolidated its customer base, the company focused more and more of its energies on an ever smaller group of its biggest customers.

The sales force consisted primarily, though not exclusively, of people with engineering backgrounds and was organized by geographic region. As customer needs became more

complex, Mr. Roche invested a great deal in building the capabilities of his sales force to connect with customers at more senior levels. They needed to be just as aware of business imperatives as technical needs.

FAEs complemented the efforts of the salespeople. When salespeople uncovered an opportunity to go for a design win, FAEs worked side by side with the customer's product developers. Sometimes, these relationships were lengthy, to the point that it became easy for casual observers in customer organizations to forget who was an employee and who was an FAE from ADI.

When the FAEs completed a design effort with a customer, the salespeople finalized the terms of sale. ADI rarely demanded compensation for the FAEs' services. Instead, they considered the FAEs' work a cost of the sale and sought to recover the costs with higher prices. That was not always easy. As Mr. Fishman described,

> It's amazing how much we get beaten up on price when you consider what a small percentage we are of the customer's bill of materials and what a large percentage we are of the user's experience. For example, most of the cost of a digital camera is in the motor control, the lens, memory, and retail distribution. And yet, the manufacturers negotiate with us over 10 cents.

Individual FAEs often focused on a single application category, like digital cameras. In fact, increasingly, ADI hired FAEs who already had application-specific expertise from prior work experience. In addition, FAEs were generally either DSP or analog specialists, as the underlying knowledge base was quite distinct. Some DSP-focused FAEs even narrowed their activities to a specific DSP, such as Blackfin.

Compensation for the sales force was not structured differently from that of other groups, and stock-option compensation was a major component. Salespeople could earn bonuses, and Mr. Roche was shifting a greater proportion of sales force compensation to variable compensation. Bonuses focused on top-line growth and were most heavily tied to design wins. Bonuses always accrued to the region that achieved the design win, even if the customer manufactured somewhere else. Mr. Roche's philosophy was that the sales team should focus most heavily on top-line growth and leave profit-and-loss management to the business units.

As the creative energy in the conference room began to wane, Mr. Roche knew the meeting was moving toward a more difficult challenge. What would it take to commit the resources necessary to get the job done? ADI had forecasted, budgeted, and committed its people to projects at the business-unit level. Thus, most of the resources necessary to build a deeper relationship with the digital camera manufacturer were already committed.

This was to be the type of negotiation that Mr. Roche and several business unit leaders found themselves wrestling with more and more frequently. Somehow, in Mr. Roche's view, ADI had to shift more of its energies from product driven to application driven. According to Jerry McGuire, co-general manager of Blackfin,

> The number one thing that we could do better as a company is to better show our customers our full range of capabilities. It's hard, because the number of internal connections you need to make is so large.

Mr. Roche anticipated more and more customers having similar needs. Some leaders of vertical business units at ADI were not sure whether working through a centralized sales group was the most attractive option. ADI's head of human resources, Tracy Keough, noted that some verticals were hiring to new job descriptions that sounded a lot like sales but were called something else.

ADI's People and Management Processes

ADI had a long run of success in attracting the best engineers in the country—over 100 each year. The company recruited nearly half its new hires through co-op programs, which Ms. Keough believed improved the selection process. ADI had developed a terrific reputation with engineering professors, and that aided its recruiting efforts. The company also had a powerful value proposition for prospective recruits. Ms. Keough elaborated:

> The engineer is king here. The only downside is that if you are not an engineer, you might be perceived as a second-class citizen. But young engineers can get a tremendous amount of responsibility at a very young age. And they feel like they will have a chance to innovate. Ray Stata [the company's chairman and founder] casts a long shadow here. His name is practically synonymous with "people" and "innovation." As a result, people strive as a point of pride to be involved in new products.

Christian Kermarrec, who led the effort to penetrate the cellular handset market, agreed. He recalled his impressions from his initial interview with Mr. Stata in the early 1990s:

> I understood very clearly Mr. Stata's model for success. It was all about employee satisfaction. Mr. Stata believes that satisfied employees are creative and innovative. That leads directly to satisfied customers, which leads to success in the market, which leads to satisfied shareholders, which leads to an ability to reward your employees sufficiently so that they will never want to leave.

In fact, most engineers who stayed with the company long term strove to work their way through a series of promotions that culminated in a possible nomination as an ADI Fellow, an honor bestowed upon only the top 1 percent of ADI engineers.

Career models at ADI enabled a switch to a management track at about the 8- to 10-year point, but making the shift did not have a tremendous impact on compensation. Engineers at ADI were well paid; besides, most seemed to be motivated in other ways. John Fernandes, another ADI engineer, shared his perspective:

> ADI provides terrific technical challenges in a flat organization where individuals can have a great deal of influence. There are minimal approvals and minimal

> bureaucracy. If you have capability, you get responsibility quickly. People are motivated because they can have a big impact.

ADI was also a place where an individual could take risks. One engineer noted that he took a job with a fledgling ADI business unit under a cloud of doubt about its durability. Nonetheless, he did not worry about his personal survival. He spoke directly with Mr. Fishman and came away convinced that there were multiple other options for him within the company. Paul Ferguson, an ADI Fellow working on cellular handsets, elaborated:

> ADI hates to pull the plug on investments. The company is patient. And in cases where we do stumble, we work hard to retain people.

Ms. Keough agreed. ADI tended to keep people indefinitely. Annual turnover tended to be roughly 5 percent. Underperformers might find themselves marginalized, but rarely were they fired.

ADI's emphasis on retaining the best people began with the first conversation with prospective recruits. Worldwide staffing director Joe Javorski described his overall approach:

> We try to paint as authentic a picture of the company as possible. We don't want people to leave unhappy because their expectations were misguided.

John Croteau, Mr. McGuire's partner in leading the Blackfin effort, described his perspective on ADI's global workforce:

> We've done a great job of integrating a lot of diverse cultural perspectives. We once made a small acquisition of a company that had a culture that we just couldn't mesh with. But when we hire one person at a time, we are able to evangelize ADI's norms, empower them, and watch them succeed. I'm very proud of that.

Mr. Fishman also believed in the preeminence of the engineer within the company, while noting how the innovation challenge was changing.

> Most semiconductor companies are making money right now. What separates you in the long run is people-driven innovation. That's getting more complex, however. In the past, you just needed the highest performing product. Now, a talented engineering design team is just one group of people you need innovating on the customer's behalf. You need close customer contact to develop system solutions for specific applications.

Mr. Fishman continued, demonstrating his talent for combining humor with insight:

> You can no longer just hire a brilliant engineer, put him in a lab, feed him three times a day, give him an occasional break for a game of soccer, and wait for the

> brilliant new design six months later! But some of our engineers still believe that's how innovation happens. Some of our most creative people are also perpetually suspicious of businesspeople wielding influence in a world of science and engineering. Talk to the customer? That's marketing's job.

That didn't mean engineers did not care about commercial success. Several engineers agreed that innovators were only happy when their products made a big splash in the market.

As products became more complex, ADI's innovations increasingly seemed to come not from individual insights, but from combinations of perspectives of multiple engineering disciplines. "Our strength is in the company, not the individual," noted Ms. Keough. That created a challenge because prospective recruits were attracted by the prospect of being involved in every aspect of a new product development effort, from beginning to end. Engineers tended to fear over-specialization.

In fact, one aspect of ADI's culture was a desire for entrepreneurship and independence. Ms. Keough reflected on some employees' reaction to the company's decision to create a human resources function and hire her to lead it:

> People even said to me, "Why do we even need HR?" There were few policies and procedures and there was an anti-bureaucracy culture. Even now, people do not look to HR for much.

ADI also seemed to have an aversion to politics built into its culture. Ms. Keough noted that certain actions were fast tracks to being marginalized in the company—for example, going behind people's backs, trying to short-circuit fair process by appealing directly to the top for resources, or poaching talented people from other business units. Zoran Zvonar, an engineer who worked on a team designing the next generation cellular handset, described his team's working norms:

> When we have conflict, we get everyone in the same room and work things out together. That is always better than politicking to the boss. This is the approach that has kept our team together for over a decade.

Mr. Fishman believed that what made such meetings successful was an atmosphere of constructive confrontation.

> You have to have a culture in which you can be direct and challenging without getting personal. I have a reputation for being argumentative and aggressive, but I endeavor always to attack ideas, not people. When I see people attacking each other, I come down hard.

This positive environment was harder to maintain when people worked across organizational boundaries. Ms. Keough continued,

> Often, the approach to cross-divisional problem solving is to get everyone in the same room and not let them leave until there is a decision. But then things often get resolved differently outside of the meeting. Tensions are inevitably high between business units because everyone wants to run their own show and everybody wants to retain the most talented engineers. We are working on ways to create more shared accountability across units.

Ms. Keough and her colleagues conducted periodic surveys to assess employee satisfaction. Of late, a new theme was emerging: "I love ADI, but I'm unhappy with compensation."

This was not surprising because stock-option compensation, together with profit-sharing bonuses, was a substantial portion of pay packages, and ADI, along with other technology companies, had experienced a major run-up in stock price in the late 1990s and then an extended quiet period between 2001 and 2005. As a result, people were earning substantially less than they had been, and this generated pressure to create greater differentiation in pay.

ADI historically had offered similar compensation packages across all employee categories (except that with seniority, variable compensation was a higher fraction of total compensation). That meant high-performing engineers received the same compensation as slackers, though they could receive spot bonuses of a few thousand dollars for exceptional efforts. (According to one ADI engineer, a single patent could double your salary at TI.) As to how the egalitarian approach affected innovation, Ms. Keough saw both sides of the coin. One could say it diminished the rewards for innovating, but it also diminished the risk.

Some employees felt that pay should be tied to divisional, rather than company, performance. It seemed unfair to some employees in analog business units that their pay was diminished by losses in the DSP division. Mr. McGuire occasionally heard comments about it but didn't find the pressures excessive. Mr. Fishman wouldn't hear any of it anyway. He explained:

> I constantly remind people that we have to strike the right balance between short-term and long-term investments if we are going to create an enduring institution.

Mr. McGuire and Mr. Croteau worried less about compensation than about filling their business unit with a sufficient number of outstanding people. Unlike the analog division, the DSP division was unable to rely on college recruiting. It took several years of work experience, spanning both the hardware and software domains, before an engineer could be productive in a DSP-related effort. Furthermore, because the DSP division's financial performance was relatively poor, it was more difficult for the division to hire. That concerned Mr. Croteau.

> We don't know how to get a big step-function increase in staff when we need it. When we land a big contract, say, with someone like Nokia, we need to be able to hire quickly. We need to be better at intense recruiting, not just steady recruiting.

> Over the past few years, we [the Blackfin group] have only been able to "fill inside straights"—that is, hire only where we had a specific missing skill.

Josh Kablotsky, a Blackfin software engineer, continued:

> It is hard to keep the recruiting steady. It is tactical. We get a budget only for specific needs, and sometimes by the time we recruit, hire, and train, the need has passed. We need to hire with more of a long-term perspective, but people costs are high these days and that notion is not popular.

Mr. Croteau commented on how recent history had put them in a bind:

> We still have a bit of an overhang from the run-up in business at the end of the 1990s. We avoided a layoff, but the economic recovery has been soft, so we are still overstaffed in some areas. Someday, we may regret not changing out more people during the downturn.

He added that he saw great importance in bringing outside perspectives when moving into new markets.

> Typically, we struggle when we build new businesses organically. We do better when we start with small acquisitions. When you do it all from the inside, it is harder because people don't know what they don't know. You learn more through trial and error. We probably needed to rely more on outsiders in building the DSP business.

ADI's Planning Processes

The most important time to make a case for greater resources each year was in the fall. The company set its strategic goals for the following year over the summer and then began compiling specific resource plans in September, starting with a multiyear focus and then focusing strictly on the upcoming year. At that point, spending decisions faced hard constraints. There was always greater appetite for engineering investment than there was money, especially from the DSP division. As a first approximation, the company set a limit to growth in engineering spending, based on growth in sales. There were always tough decisions to be made. The company did not want to make the mistake of taking on too many projects, under-resourcing them all, and failing at all of them as a result.

Part of the discussion always focused on whether the company should discontinue investments in underperforming projects. Some senior executives felt ADI's biggest weakness was reluctance to walk away from investment before failure was absolutely unambiguous. For example, ADI had poured capital into the crash-sensor business for over a decade before it proved itself. What if that capital had been invested elsewhere?

There was also greater appetite for sales force spending than there was in the budget. Total sales spending was set as a percentage of the company's total budget. As part of the planning process, the sales force agreed to goals by account, and responsibility for

achieving goals was assigned to individual salespeople. Still, business units competed for sales force attention. Although sales force commissions were only 12 percent of total compensation, it could be hard to shift attention to products that were more difficult or took longer to sell. Sales force managers monitored contact reports and evaluated salespeople based on progress towards long-term sales to counter the natural tendency to focus on the immediate.

The company produced quarterly forecasts and conducted tactical reviews toward the end of each quarter, focusing on what could be improved in the following quarter.

Business unit managers were accountable for delivering on plan. Although it was possible to update the plan based on new information at the end of the quarter, it wasn't necessarily pleasant. There was greater leeway for business units that were making more speculative investments in innovative products, but the discussions were no less rigorous.

When reviewing business performance, ADI's philosophy was that the purpose of planning was only secondarily in the numbers themselves. The primary purpose was to generate good dialogue. The challenge was to diagnose how the environment was changing, how the business was doing, and what could be done to improve it. ADI's senior team wanted business unit leaders to feel empowered to do the right thing, not to defend plans as written.

There were common metrics across all business units to help compare performance, particularly gross margins and operating margins. Standards for what constituted acceptable performance varied, however, as each division faced its own market realities.

Each business unit had a controller from Mr. McDonough's staff who provided financial information to the general manager. More experienced controllers had a stronger voice, advised the general managers more closely, and influenced perceptions of performance more heavily.

Innovation at the System Level

Mr. Fishman continued to wrestle with the innovation problem. Could ADI be as successful at system-level innovation as it had been for 40 years at component-level innovation? TI was the only other company in the world that could compete with ADI in bringing together digital and analog expertise, and ADI was much better in analog technology. Mr. Fishman believed if ADI were also better at systems, it could start displacing TI in the marketplace, one customer at a time.

If it could not, the company could just as easily fall into a slide. One ADI engineer reflected,

> It is becoming a systems business. Customers want solutions, not parts. The more of the solution you provide, the more opportunity you have. More and more you see analog and digital together, such as in the new "USB II" PC interface device.

Even with basic converters, we are doing more with digital correction. We have to solve the problem because when you don't control the solution, you can be completely iced out of the market.

Questions:

1. How did ADI's organization evolve between 1985 and 2005?
2. Was ADI organized optimally in 2005? Why or why not?
3. What changes, if any, would you advise? Consider:
    a. hiring and promotion practices
    b. reporting structure
    c. key roles and responsibilities
    d. measurement of business performance
    e. budgeting
    f. compensation
    g. culture
4. How would you bring about these changes? Over what time period?