



ELIYAHU M. GOLDRATT

CRITICAL
CHAIN

A BUSINESS NOVEL

BY THE AUTHOR OF THE GOAL AND IT'S NOT LUCK

CRITICAL CHAIN

Eliyahu M. Goldratt

THE NORTH RIVER PRESS

Copyright 1997 Eliyahu M. Goldratt

All rights reserved. No part of this book
may be reproduced or utilized in any form
or by any means, electronic or mechanical,
including photocopying, recording, or by
any information storage and retrieval system,
without permission in writing from the
Publisher.

THE NORTH RIVER PRESS
PUBLISHING CORPORATION
P.O. BOX 567
GREAT BARRINGTON, MA 01230
(800) 486-2665

Manufactured in the United States of
America

ISBN 0-88427-153-6

Chapter 1

“This board meeting is adjourned,” announces Daniel Pullman, the domineering chairman and CEO of Genemodem. The elegant conference room hums with conversation as the directors start to depart. The last quarter was the best in the history of the company. The directors are pleased, but no one is overly excited. They have come to expect it. For the past six years, almost every quarter has been better than the preceding one.

“I want to have a word with you,” Pullman tells Isaac Levy, smiling and continuing to shake the hands of the external board members. When everybody else leaves they sit down.

“Have you had a chance to read McAllen’s final report?” Pullman asks.

It was Levy, the executive vice-president of engineering, who had insisted on hiring a consulting firm to do an in-depth analysis of Genemodem’s product development. The analysis was not restricted just to engineering, it covered the entire process. Starting with examining the way they decide on the features of a new modem, through the development process, and of no less

importance, examining the way the new design is handed over to production and marketing.

Not that they had been complacent. Embarking on new technologies, new tools, even new management methods is the norm in their company. You cannot be among the leaders otherwise. Nevertheless, Levy insisted on bringing in experts from the outside. "There must be many things that we take for granted," he had claimed. "Things that only outsiders are able to see." Pullman supported him fully. Actually, no one really objected.

It was no small effort, and it did not come cheap, but at last, a week ago, they had received the four-hundred-page report.

"I really think they've done a very good job. There are many things they point out that we overlooked. We got our money's worth and then some," Levy says.

"Agreed. The report contains many good things. But I am concerned with what it does not contain. Isaac, if we were to implement everything they talk about, how much do you think our development time would shrink?"

"Hard to tell. Maybe five percent. Maybe not even that."

"That's my impression as well. So, we explored every conventional avenue and, as we expected, the answer is not there." Pullman stands up. "There is only one thing left to do. Isaac, launch the think tank."

"It's a long shot." Levy stands up as well.

"Very long, but we are skating on very thin ice." On his way out, Pullman adds, "We must find a way to rectify it. We must."

Isaac Levy looks at the three young managers sitting in front of his desk. He does not particularly like what he sees. They are not senior enough. All three are too young and too inexperienced for the task. But that was Pullman's decision.

"Isaac," he had said, "a senior person is already engraved with the way we are doing things. If there is someone who can find us a much better way, it's a young person. Young enough to be rebellious, young enough to be unsatisfied with our rules. Do

you remember how young and inexperienced we were when we started? We broke every convention, and look at where we are now!"

Isaac didn't see any point in reminding him that they also "succeeded" in running their first company into the ground.

"Do you know each other?" he asks the three. "Why not introduce yourselves. Mark, you start."

"I'm Mark Kowalski. I'm with engineering."

Mark is thirty-two years old. A big man, with a voice to match. He has been with the company for eight years and recently was promoted to project leader of the A226 model. He is not the rebellious type that Pullman wanted, and Levy is not happy about risking the development of the A226, but they need a good group leader.

"Mark will be your group leader," Levy adds. "We think he is open enough to handle constructive criticism, knowledgeable and sensible enough to reject impractical criticism, and pleasant enough to ensure harmony. And if he is not, you tell me."

They are too nervous to laugh. This is the first time any of them has ever been invited to an Executive VP's office. Levy gestures to the woman to speak up.

She follows the pattern Mark used: "I'm Ruth Emerson. And I'm from marketing."

"And your job there?" Levy encourages her to elaborate.

"I'm a brand manager. I was on the team that planned the introduction of the A106."

The other two are impressed. The A106 is the current big success.

"Ruth was chosen," Levy explains, "because of her exceptional integrity. You are going to find out to what extent she is not afraid to ask questions."

"I'm Fred Romero." The last member of the group responds to Levy's look: "I'm a bean counter."

"Not exactly a bean counter," Levy laughs. "Fred is the rebel of finance. And at the same time the most respected project au-

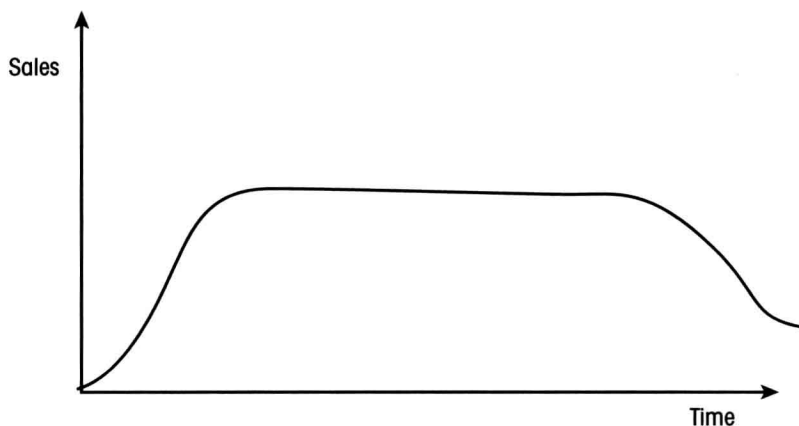
ditor that we have. You are all probably wondering why you are here?"

Mark and Ruth nod. Fred maintains his poker face.

"From now on, you are a think tank. Your mission is to find a solution to the biggest threat endangering the future of this company."

He pauses to look directly into the eyes of each one.

"Let me start by explaining the problem." Standing up, he grabs a marker and plots a curve on the white board. "Do you recognize this curve?"



"You'll find it in every textbook. It's supposed to describe the lifetime of a product. First, sales are picking up as the product is introduced into the market, then they stabilize—it becomes a mature product, and finally, it fades out. Does it fit what we know about our products?"

They believe this is a rhetorical question until he says, "Well?"

"In our case, it looks more like a triangle," Mark volunteers. "Before we finish introducing a new modem into the market, we obsolete it by launching an even newer one."

"Which doesn't make sense?" Levy questions.

"I didn't say that," Mark hurries to clarify.

"If we don't launch the new modem," Ruth comes to his aid, "our competitors will. In any event, the current modem will be obsolete. The only difference is that we'll also lose market share."

"Correct. The frantic race in the market forces us to launch a new generation of modems every six months or so."

They all nod.

"Now let me explain something that you might be less familiar with. Our company's shares trade on Wall Street for sixty-two dollars and forty-eight cents, according to yesterday's paper. This high price is not justified by the company's assets, or even the company's profit. It is mainly based on the shareholders' expectations of future growth and future profits. Well-founded expectations based on our impressive track record. But do you realize how fragile that is?"

When no one answers, Levy continues. "To miss once, to launch an inferior product, or even to launch a good product three months after the competition, what will the impact be? Ruth?"

"It would be a disaster. We would lose significant market share."

"Where is good old-fashioned customer loyalty?" Levy sighs. "Gone." And then, in a more serious tone, "If we miss once, our per share value will plummet. The damage to the shareholders will be mammoth. If we miss twice in a row, maybe there won't be a company for us to work at."

He pauses. The three young managers look at each other.

"Our products have a very short life-span. Right now it's about six months, and all indications are that it will continue to shrink. At the same time, in spite of all our efforts, our product development time is roughly two years. Do you see our problem?" He pauses again.

After awhile he echoes their thoughts: "A development time of two years, when we have to launch the fruits of our development every six months, means only one thing. The question is

not 'are we going to miss?' The question is 'when are we going to miss?' And remember, we cannot afford to miss even once."

They sit silently, digesting what has been said. Finally Levy speaks up. "Your mission is to find a way that will enable us to drastically cut our development time. For years we have been looking everywhere for the answer, and have not found it. You are what we have left. You are the ones who must find the answer."

"But, how?" Mark's face is red.

"That's the whole point, Mark. We don't know how! You'll have to tell us."

"What help can we expect?" he desperately asks.

"You will continue to be in charge of the A226. You will use that project as your test ground. You can choose anyone you like as your backup. Ruth and Fred, you are released now from all your other duties. If you need to visit other places, to attend conferences, or even to register for a formal Executive MBA program, just ask. No budget restrictions."

"To whom do we report?"

"Directly to me, and I do expect periodic progress reports."

"How much time do we have?"

"The A226 is scheduled to be ready in sixteen months. I expect it to be completed on or before time. By the way, think tank, if you come up with a good answer, there are a lot of shares waiting for you."

"How many are a lot?" Fred can't hold himself from asking.

"Ten thousand shares each," Levy answers. "Good luck."

After they leave, Mark says, "Good luck is appropriate. I guess we have about as much chance as winning the lottery."

"The reward is like the lottery, too," Ruth comments. "Ten thousand shares is a fortune. We are going to be millionaires."

"Fat chance."

Chapter 2

I pick up the memo and read it again, for the hundredth time.

Dear Rick,

You have been assigned to teach a course in the Executive MBA program.

We need to determine which course it will be.

Does Monday at 2 P.M. suit you?

Jim.

Only three sentences, but the implications . . . The implications . . .

I teach at a business school. But I am no longer at the bottom of the academic hierarchy. A year ago I was promoted from the doormat level of assistant professor to the semi-respectable position of associate professor. Frankly, it was a miracle, considering the abysmal number of academic papers I have had published. On the other hand, it wasn't, not if one takes into account the name I've built for myself as an exceptional teacher. It's no small effort turning each session into a learning experience, but it pays off; my courses are always the first ones to fill up.

Here, in black and white, is the latest proof. Just three sentences. This time I read the memo aloud.

"You have been assigned to teach a course in the Executive MBA program."

The words sound like a symphony. No wonder. Being assigned to teach in the Executive MBA program is a sure sign that next year I will be recommended for tenure. And tenure is Shangri-La. It's having a permanent position. Whatever you do, or don't do, you can't be gotten rid of. It's being in; it's security.

And security is what I need. And so does my wife. Like everybody else who wants a place in academia I was, listen to this, I was "accepted on probation." I think that only paroled criminals and young professors are formally on "probation." The difference is that professors are on probation for a longer period. Five years to prove myself as a good teacher. Five years to prove myself, to the other faculty members, as a team player.

"Does Monday at 2 P.M. suit you?"

Jim, buddy, it definitely suits me.

Two o'clock seems an eternity away. I decide to take a walk. It's cold outside. There's over a foot of new snow on the ground, but the sky is clear and the sun is high. It's almost one o'clock.

The first time I tried for tenure I blew it. Five years down the drain. It was a good university, bigger and more prestigious than this one. But I had to open my mouth. It's one thing to criticize the inadequacy of our textbooks, or to highlight that we are supposed to teach our students not just make them memorize. But it's a different ball game to criticize the publications of my fellow professors. Especially the senior ones.

They say that smart people learn from their mistakes while wise people learn from others' mistakes. Well, I'm not wise. I was never wise, but I am smart. All it takes is to be hit on the head, five to ten times, and I immediately learn my lesson. The details are ugly. It doesn't matter. What matters is that this time it's different. This time I'm making it. Big.

Almost nobody is outside. Or more accurately, no one except

for me is idly strolling. In spite of the patches of ice almost everyone is running. It's simply too windy. But I'm not cold.

Life is beautiful. I'm already an associate professor. Tenure is in the bag. The next step is getting full professorship, and then a chair. That's the ultimate. A chair means more time for research. It's being one of the big boys. It's a salary of over one hundred thousand dollars a year.

Such a salary is beyond my comprehension. Give me half of it and I'll be happy. After years of being a doctoral student living on a grant of twelve thousand a year, and too many years of living on the salary of an assistant professor . . . Hell, even a high school teacher seemed rich.

I rub my icy nose. I'll never get promoted to full professor if I keep neglecting the need to publish articles. One might get tenure by being a good teacher and a nice guy, but full professor is another story. "Publish or perish." That's the name of the game.

I hate this game. Maybe I hate it because I don't have the kind of ideas that can be converted into acceptable articles. I don't know how they do it. How they find those small examples that with enough mathematical modeling they can turn into another publication. I need something more tangible, more connected to the real world, real problems. Besides, now I am getting cold. I'd better head back.

I wonder what course Jim is planning to land on me. He wrote that we need to determine it, but it really doesn't matter. Whatever it is I'll have to spend a lot of time preparing. You can't compare teaching an Executive MBA course with teaching a regular MBA course, not to mention an undergraduate course. In the Executive MBA program the students are not full-time students. Actually, they are full-time managers spending one Saturday in class every two weeks.

My strides become longer. It's not just the flush of adrenaline, I'm half frozen. Teaching managers, that will be a new experience for me. They're not going to accept everything I say just because I'm quoting from a textbook. They will force me to deal with the real life situations they face. This may actually be a

good thing. It might even give me some new ideas for research . . . and articles.

Ideas are not enough. I can't do research in a vacuum, at least not the type I'm willing to do. But maybe, if I play my cards right I can use these students as bridges to companies. It's possible.

I reach my building. A cup of hot chocolate will help me defrost. I stop near the machine; it's ten 'till two. I'd better hurry.

"Yes, thank you," I accept Jim's offer of coffee, and following his gesture, lower myself into one of his squeaky, uncomfortable upholstered chairs.

"Make it two," he says to Miriam, his colossal secretary, and chooses the sofa.

Status symbols are important in universities and Jim has a room that matches his position. A big room, a corner room. I should rephrase that. I don't know if status symbols are important in every university, but they sure are for the dean of our business school. Our dean will not let anyone forget which is the most important school. And he has a point. The business school has grown, by now, to over six thousand students—almost half the student population. Full professor Jim Wilson heads the most prestigious program of the school, the Executive MBA program. It's no wonder Jim was assigned such premises. I only wish he had better taste in furniture. On second thought, knowing the extent to which Jim is oblivious to anything materialistic, it's probably Miriam's choice. Yeah, that figures.

"Thank you for the opportunity," I earnestly say. "I will not let you down."

"I hope not," he smiles. And then, without a smile, "Richard, that's one of the things I wanted to discuss with you."

I lean forward. When Jim calls me Richard it is serious.

"Richard, as you know, there is no lack of more senior candidates who want to teach in the program. Do you know why I insisted on you?"

I don't. I only know that Jim liked me even before I was his doctoral student. I'll never forget that when I was struggling to get a second chance in academia he was the one who arranged for me to come here.

"I chose you because of your unique style of teaching," he surprises me.

"Teaching through open discussion?" I'm astonished.

"Yes," he says categorically. "For this program I'm more and more convinced that that is the only prudent way. The students have the relevant day-to-day experience. Open debate, steering a group of people to develop the know-how themselves, is how we should teach them. And I don't have many instructors who are both willing and know how to do it."

Now I understand, but it scares me. "Jim," I start to protest, "it's one thing to do it with regular students, but I'm not sure I can do it with actual managers."

"Why not? What's the difference?"

"What I'm actually afraid of is that I won't be able to steer them. That my theoretical knowledge will be insufficient relative to their practical knowledge," I answer frankly.

"Don't." Jim is firm.

"But . . ."

"Listen Rick. With these students, the most important thing is not to pretend to know when you don't. They pay a lot of money for tuition—much more than regular students, and they have an open door to the dean and even the president, and they don't tolerate garbage."

I start to wonder if I'm up to it. Maybe it will be my downfall.

My thoughts must be written all over my face because Jim starts to cheer me up. "How many years have we known each other? Huh? I know that I can trust you to be open with the students. And over and over you've proven to me that you know much more than you think you do. Don't be afraid to use your regular style. I'm sure it will work with them."

Not having much choice, I promise, "I'll do my best."

"Good." Jim is pleased. "Now all we have to do is decide

which course you'll teach." Heading toward the door he casually adds, "Have you given it a thought? Miriam, what happened to our coffee?"

He disappears into her room. A minute later he reappears with a tray.

"Jim, when I started my doctoral thesis, do you remember the warning you gave me?"

"I gave you so many," he grins, handing me a cup. "Which one are you alluding to?"

"Not to bite off too much," I remind him. "To forget the dreams about changing the world and take on a subject I could finish."

"Yes, I do. Good advice. Especially to a Ph.D. student."

I take a sip of coffee. "When is the right time to dream?" I ask.

He looks at me for a little while. "The middle age crisis!" he announces his diagnosis. "What does that have to do with which course you want to teach?"

I decide to answer his question with a question. "Isn't the course I'm going to teach in the Executive MBA program going to affect what research I'll be concentrating on?"

He thinks about it. "It might," he admits. When I don't reply, he grins, "So you want to make a difference. You want your research to be a yardstick for an entire field."

I nod.

He examines me for a little while longer. "I guess that the only way to flush it out of your system is to give it a try. So in which field do you contemplate making your contribution, Dr. Silver?"

"I don't know," I admit, ignoring the sarcasm. "A field in which the existing know-how is not enough."

"That's true for every field in business," he dryly says.

"What I mean is . . ." I'm searching for the words. "A field where it's apparent that the existing know-how is not giving satisfactory answers."

"What satisfactory answers are is a matter of opinion." Jim is

thoughtful. "Try to specify what you don't want; maybe that will lead somewhere."

"I don't want to chase fads," I firmly say. "And I don't want a field that is overcrowded with research."

"That makes sense. Go on."

"I want a field that is in real need," I repeat myself. "A field in which no real progress has occurred for quite some time."

"Fine," he says, waiting for me to at last specify which course I do want to give. The problem is, I don't know. It's very embarrassing.

"Project management," Jim slowly says, "fits your description like a glove. If you are looking for a field in need, project management is a prime candidate. And in the last forty years or so, at least in my opinion, nothing new has been suggested."

"But, Jim, you teach that course."

"True, true." He starts talking to the ceiling. "And besides, I have used the course to start some interesting research. Quite interesting research."

"I could help you finish it. You know that I'm good at doing the library digging, and my writing abilities are decent."

"Yes, they are." He still stares upward.

"Jim, let me teach this course for one year. One year only. I'll do my best to help you finish your research. I'll do all the dirty work."

He shifts his eyes to the table and starts to talk, more to himself than to me. "I would like to concentrate on my production systems course. So much has happened in that field lately. It will be good preparation for a nice textbook." He looks me straight in the eyes. "So, about the project management course and the related research, what exactly do you suggest?"

Chapter 3

She is tall, over six feet tall. And slim. Elegantly dressed. Almost too elegant. Always. Not the type one calls beautiful, but striking. First impression is of expensive silk. Maybe because she never raises her voice, maybe because of the traces of a soft Southern accent. But it's just a first impression and it doesn't last for long. It's the underlying steel that is hard to escape noticing.

She is analytical, ambitious, an excellent manipulator, and she introduces herself as B.J. vonBraun. That's also the way her name appears on her letterhead. The rumor is that the first initial stands for Brunhilde. Nobody dares verify it. Her letterhead also says: University President. The crowned, unchallenged queen. And there is no king, not recently anyway.

It's summer, and Washington, D.C., is sweltering. It's hot even after sunset. But not at the restaurant where the university presidents are holding their formal dinner.

B.J. is seated between Bernard Goldsmith and Alistair Franklin. It wasn't too difficult to maneuver them to sit with her. Both are sharp, and experienced old acquaintances. But most impor-