Of Coase and Chaos

A Personal Perspective on the Decreasing Management Challenge

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This text is a transcript of an oral presentation and has been only edited slightly. Thus, it is not intended for broad distribution.

Here is Edward bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin. It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think of it. And then he feels that perhaps there isn't.

Here is Edward bear...

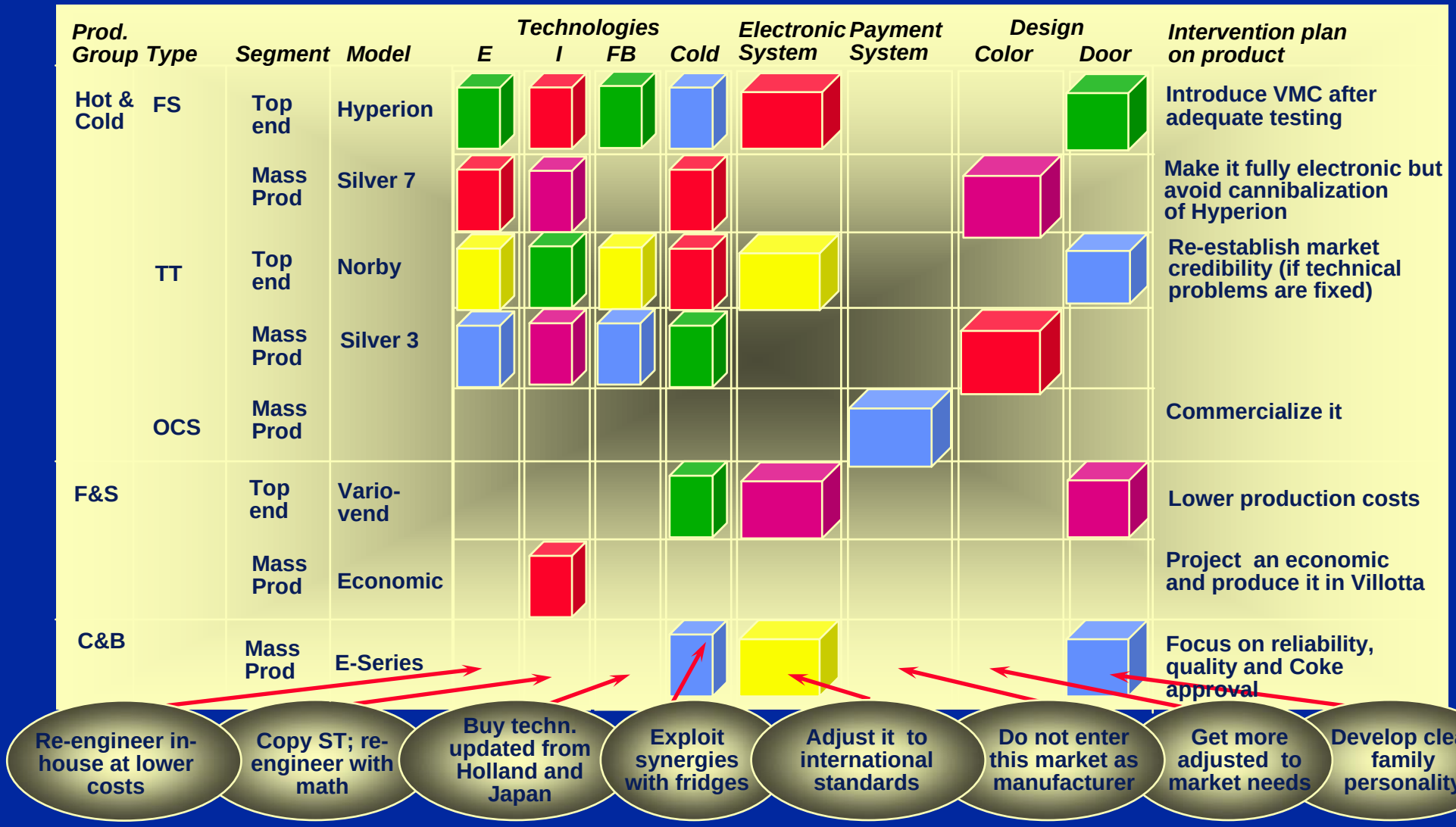
In this presentation I will try to have us all stop bumping for a while and think about what management is all about.

Never before in the history
of mankind has management
been so simple

Never before in the history of mankind has management been so simple

I have a fundamental statement: Never before in the history of mankind has management been so simple. This is not as stupid a statement as it seems initially. Consider this for example: if management has not become simpler (all other things equal), why is it then possible for companies to expand their reach from serving the local market around a factory, to going national, and finally working on a global scale.

Managing appears complex in real life



Managing appears complex in the real world

In real life, however, management appears extremely complex. This exhibit is one example of complexity in management. The content of it doesn’t matter, it’s only an example. But the message is clear, most managers face situations they consider difficult, if not impossible, to manage well.

So what is true? Could it be that the apparent complexity is self-imposed and things both could and should be made simpler? Let’s have a look.

Simple management

- The theoretical foundation
- A prescriptive model

Simple management: the theoretical foundation

In the following presentation I will conclusively prove that management is getting simpler and what it means in any company. Thereafter, I will describe the only correct model for how to manage a company.

In short, I will make an utter fool of myself.

Societal changes enable simplification

- Deeper and broader education
- Better communications
- More information available
- Maturing products
- Harmonizing tastes
- Stronger legal and financial frameworks

Societal changes enable simplification

Before going into the theoretical foundation of simple management, let me briefly touch on some of the changes in society that enable simplification. I trust you agree that none of these changes are controversial or wrong.

- *Deeper and broader education*. Over the last 100 years or so (since the start of common education) the quality of education has improved steadily. This is evidenced by the abundance of highly skilled people in most countries. Another outcome of this is a much better understanding of management processes

- *Better communications*. I suppose we all agree that communications have improved tremendously through air transport, telephone systems, etc.

- *More information available*. There is no doubt that there is high quality information available in enormous quantities, and easily found, compared to in the old days.

- *Maturing products*. The notion here is that most products developed over the last 100 years are fairly mature. Obviously, there are exceptions in electronics and pharmaceuticals, but most products have entered the stage of reasonable maturity.

- *Harmonizing taste*. While this is happening slowly it is surely happening. An excellent example is MTV.

- *Stronger legal frameworks*. The knowledge of how to frame contracts, and to solve legal disputes is infinitely stronger today than, e.g., 50 years ago.

With this as input, let us now look at the theoretical proof of my argument. I would like to discuss two theories. The first is Coasian theory. Ronald H. Coase won this year's (1991) Nobel Memorial Prize in Economics for his pioneering theory on the nature of the firm, first published in 1937. The theory is fairly complicated but I will attempt to explain it with one exhibit. Thus, bear with me when I turn to the next slide that contains many thoughts.

Coasian theory

Market

[Price as regulator]

Market transaction costs

Firm

[Bureaucracy as regulator]

- Price determination
- Contract creation
- Information failure

Internal transaction costs

"Why is there any organi-zation?"

- Administration
- Resource misallocation
- Demotivation

"Why isn't all production carried out by one big firm?"

Adapted from "The Nature of the Firm", Ronald Coase (1937)

Coasian theory

Let me walk you through the theory by touching on each of the six points on the exhibit.

Ronald Coase was the first person to articulate that there are two ways of making business (or transactions). On the one hand transactions can be made in the open market between two parties, on the other hand it can be done internally in a firm without using the market.

1. The essential characteristic of the market is that *price* is the regulator of the transactions. Products or services carry a price and a potential buyer makes his or her decision based on the trade-off between the benefits and the price. A commodities market (e.g., the Chicago Mercantile Exchange) is a good example.

2. Transactions are also made within firms without the market mechanism. Here, in the purest form the *bureaucracy* (without any value judgment on the word bureaucracy) is the regulator of the transaction. A planning department, for example, decides that a product should move from work-in-progress inventory to machining. A good example of bureaucracy as the regulator is the old Soviet planning system -- Gosplan. (By the way, it is something of a paradox that CEOs of companies usually speak passionately about the need for open markets with free competition and prices, when their own companies internally are excellent examples of the opposite.)

3. Given these two regulating mechanisms for transactions, Coase asked two fundamental questions. The first was: “Why is there any organization?” This is a very deep question if we think about it. Why aren’t all transactions carried out in the open market place? Why don’t we just buy and sell services to and from each other? (Note: scale economies have nothing to do with this.)

4. The other fundamental question asked by Coase was: “Why is not all production carried on by one big firm?” This is an equally deep question. If the market place is not the right place to execute transactions in, why can not all transactions be made within one firm that is active in all countries and makes all products and services mankind need.

5. The answer to both questions is transaction costs. First, the market transaction cost. The reason not all transactions are made in the open market is that there are costs associated with dealing in the market. The most important are:

    - There is a cost of determining the price of a product or service
    - The cost of creating the contract can be significant
    - Information failure, not giving information or giving the wrong information, is usually costly.

6. Second, internal transaction costs explain why the firm is not the optimal vehicle for transactions. The most important costs are:
    - The administrative cost of determining what, when, and how to produce
    - The cost of resource misallocation since planning will never be perfect
    - The cost of demotivation since motivation is always lower in large organizations (the so called lack of incentive intensity).

In any given industry the relative size of market and internal transaction costs will determine what is made where.

What is interesting to us is the trend in the transaction costs. Are the different categories larger or smaller than, e.g., 50 years ago. On the market side clearly all categories are declining. Better information and more sophisticated pricing methods lower the cost of price determination. Well-educated people and strong legal frameworks make contracts cheaper. And better communications together with more information available reduce the cost of information failure.

On the internal side we see the opposite. The cost of demotivation increases as employees are better educated and demand more. The cost of resource misallocation (human, physical, and capital) is increasing as markets become more and more competitive (maturing products). The only category that is trending in favor of internal transactions is the administrative cost that is declining (ceteris paribus).

The result? Over time, the market has, and will gain “market share” from the firm.

Implications of Coasian theory

- **Less vertical integration**
  - **Component sourcing**
  - **Assets**
- **More de-coupled value chains**
- **More external services**
  - **Menial**
  - **Professional**

Implications of Coasian theory

Since Coasian theory predicts more and more market transactions, companies will change. Let me briefly talk about some of the changes:

- We will see less and less vertical integration as companies buy more components, machines, and other assets from the outside. Just look at the organization chart of a company 35 years ago and compare it with today, and the point is evident.

- Decoupling of the value chain will become more and more common. This means that a company may buy an entire engineering function from the outside, or quality control from a specialist consultant. A good example of this is in the construction industry where throughout the life of a construction project different specialists are active.

- Companies will use more and more external services. This is already happening with services such as canteens, flower management, accountants, and management consultants. Another good example is the trend towards outsourcing of information systems with, among others, EDS as a highly successful computer services provider.

The theory thus implies that the scope of the company is shrinking.[1] Fortunately, what the theory predicts can be observed in the real world.

Now we understand that the scope of the company has to decrease as external market transactions become more and more competitive relative to internally organized transactions. Let us turn to the second theoretical foundation for the simple management statement.

[1] While the scope is shrinking, the theory also predicts that the reach of a company will increase. By reach I mean geographic or product reach. Geographic reach is illustrated by globalization. More surprisingly, if I am not using the theory wrongly, it should predict more and more conglomerates over time.

“It's important stuff... it has a lot to say about the inherent unforecastability of things and why things we put a lot of faith in don't work.”

Robert Waterman, Jr.

It’s important stuff...

Let us apply chaos theory to management. Chaos theory is a scientific theory developed since the mid-1960s that explains why most processes in nature behave in a chaotic manner and why many things are inherently impossible to predict. It is a fashionable theory, but this does not detract from its power. For example, a McKinsey alumnus, Robert Waterman Jr. (who co-wrote *In Search of Excellence*), made some very profound statements about chaos theory as evidenced by this exhibit.

Let us understand the basic essentials of the theory so that we can apply it to management.

Turbulence makes predictions theoretically impossible

$$\rho\frac{d\mathbf{u}}{dt}+\rho(\mathbf{u}\cdot\nabla)\mathbf{u}=\mu\Delta\mathbf{u}+(\mu+\lambda)\nabla\,\mathrm{div}\mathbf{u}-\nabla p+\mathbf{f}$$

Navier-Stokes equation

ρ	=	Density vector of the gas or fluid
$\mathbf{u}$	=	Velocity vector
p	=	Pressure vector
$\mathbf{f}$	=	Volume force vector
λ, μ	=	Viscosity constants

Implication: Increased turbulence in the weather (or an industry) dramatically reduces the predictive time horizon

Turbulence makes predictions theoretically impossible

We are trained to think about the world in a linear (or sequential) manner. As business managers we put phase after phase, step after step, and build towards the ultimate goal of improved performance and higher profits. We break down problems into parts and add up the answers.

However, most of the world isn't linear. Many processes in nature and life are inherently chaotic and can not be predicted, even with the best computer models or the best theoretical formulas. An example of this is the weather. Over the last 20 to 30 years meteorologists have invested hundreds of millions of dollars in super-computers to create better weather forecasts. However, chaos theory proves that this is futile and will not lead to improved weather forecasts beyond a point close in time. **It is theoretically impossible to make most types of detailed predictions**. The exhibit shows the equation that explains this for the weather or for fluids.[2] Similar equations can be (and have been) constructed for management processes such as demand forecasting.

One fundamental truth in chaotic systems is that the predictive horizon becomes shorter as turbulence increases. Thus, if turbulence increases in business, the predictive time horizon should decrease or even disappear. Is this happening? It is hard to say, but I am sure we all agree that most long-term predictions in companies are wrong. This is not for lack of good people, poor information, or shoddy work. The reason is a law of nature that cannot be circumvented.

What does this have to do with simple management? Well, if turbulence increases and the predictive horizon thus decrease, there is no point in having management create complex long-term solutions. A lot of the things managers worry about are totally unnecessary and can be eliminated.

Next, let's put together Coase and chaos to understand the full picture of why management is becoming more and more simple.

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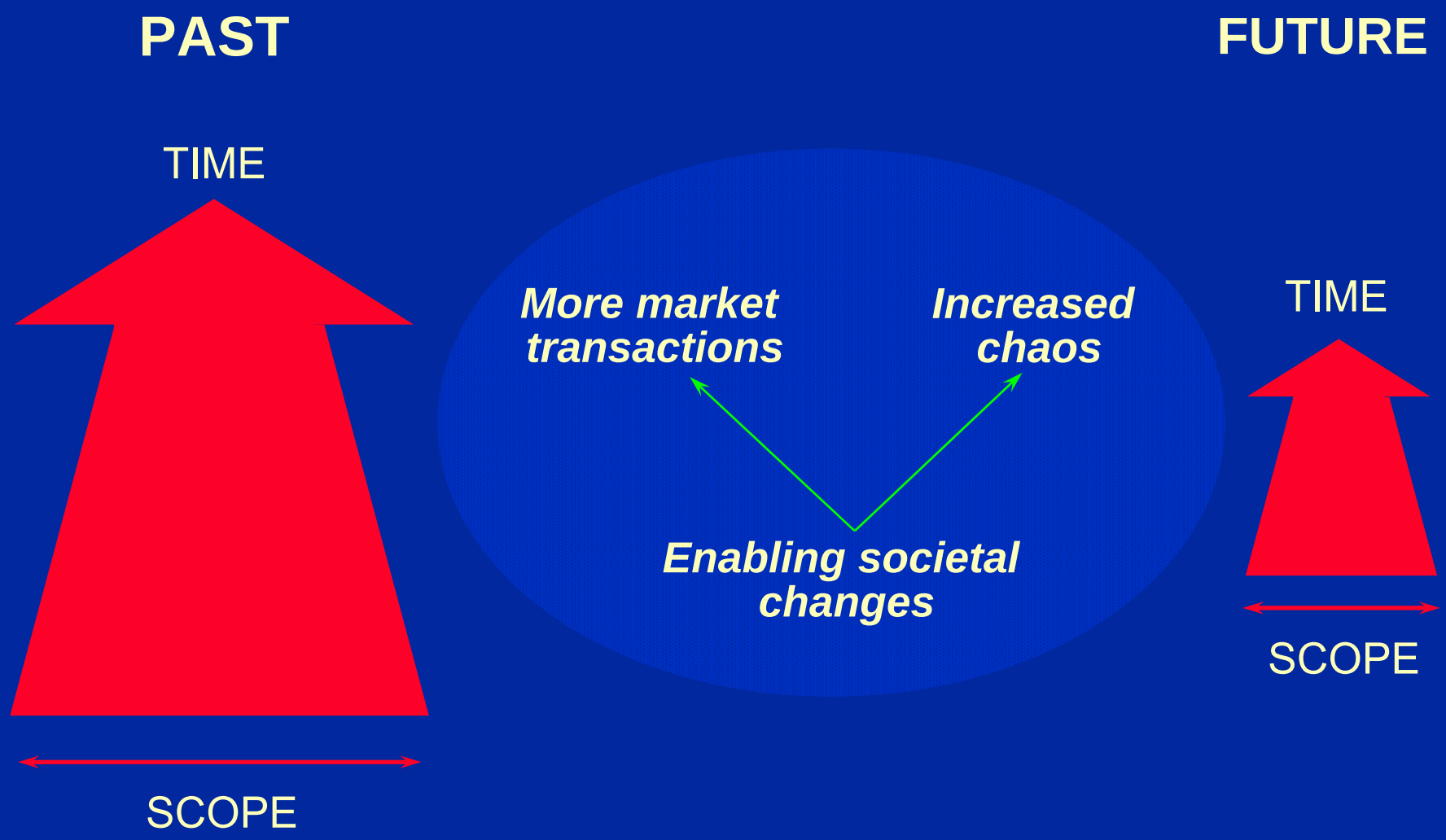
[2] Navier-Stokes equation replicated from *The Encyclopedia of Mathematics and Its Applications* by C. Foias, O. Manley, R. Rosa, and R. Temam, Cambridge University Press (2001).

Coase and chaos make management simpler



Coase and chaos make management simpler

When we put Coase and chaos together the message is clear. Management is getting simpler. Coasian theory helps explain why the scope of companies is decreasing. Chaos theory explains why the time horizon is becoming shorter and shorter.

Graphically, this can be illustrated by an arrow where the base of the arrow is the scope of the company and the length of the arrow is the time horizon. We see a picture where we go from a broad base with a long arrow, to a narrow base and a short arrow, due to the lower market transaction costs and increased turbulence created by societal changes. The area of the arrow decreases, i.e., management gets simpler.

Now that we understand the theory behind the notion of decreasing management challenges, let’s apply it to management itself and see what the implications are.

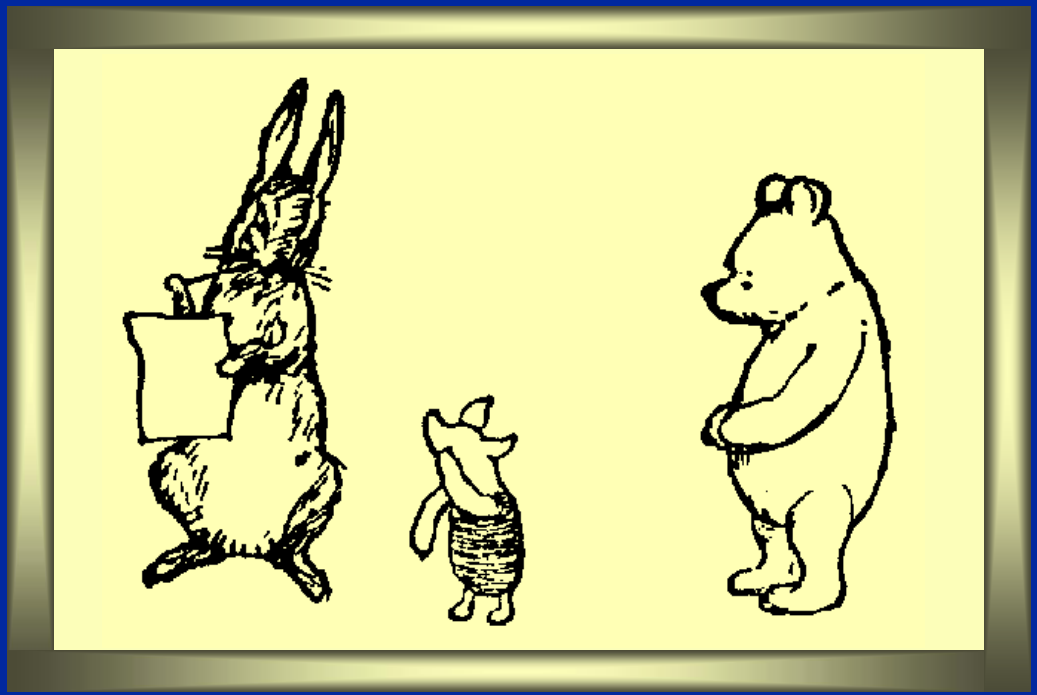
Simple management

- The theoretical foundation
- A prescriptive model

Simple management: A prescriptive model

How is management becoming simpler? What does it mean for the manager himself? I will offer a prescriptive model in which a number of managerial notions are tested against the theories of Coase and chaos.

"Rabbit's clever", said Pooh thoughtfully.
"Yes", said Piglet, "Rabbit's clever. And he has Brain".
"Yes", said Piglet, "Rabbit has Brain". There was a long silence.
"I suppose", said Pooh,"that that's why he never understands anything".



Rabbit’s clever...

Before we look at the model, let me just remind you of the profound message in this Winnie-the-Pooh slide. Often, people are so intelligent that they really don’t understand anything. In fact, I would argue that a lot of the complexity created in today’s companies is due to the human being’s tendency to strive for complexity.

With this in mind, let us turn to the application of Coase and chaos on the task of management. First, we have to ask ourselves what is management? A simple answer to this question is to turn to the management gurus and see how they define management. Doing this, we find that Henri Fayol was the first person to define a manager’s task. Why not use his definition that seems to be as good as any.

Five cornerstones of management

1. ***Forecast and plan***

   Examining the future and drawing up the plan of action

2. ***Organize***

   Building up the structure, material and human, of the undertaking

3. ***Command***

   Maintaining activity among the personnel

4. ***Coordinate***

   Binding together, unifying and harmonizing all activity and effort

5. ***Control***

   Seeing that everything occurs in conformity with established rule and expressed command

Henri Fayol (1916)

Five cornerstones of management

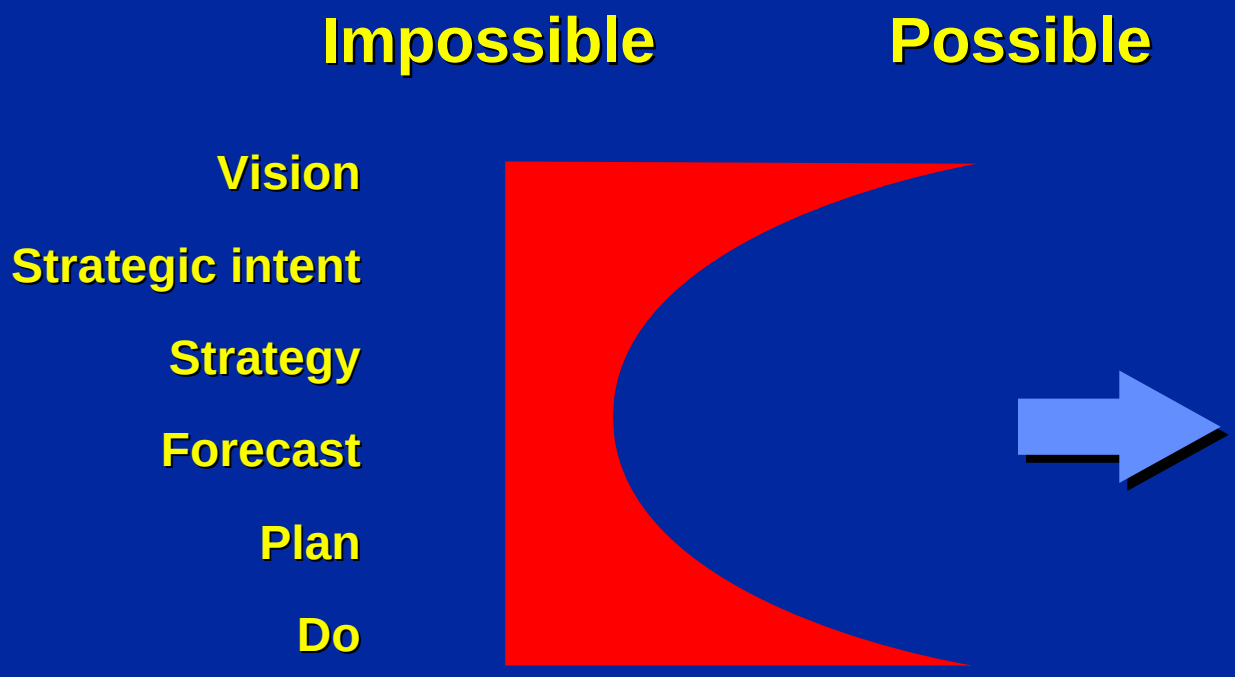
Henri Fayol was probably the first systematic management thinker. He made his observations of how organizations worked by studying his own company, a French mining and mining equipment company. His studies led him to believe that there are five essential tasks for a manager.

1. Forecast and plan
2. Organize
3. Command
4. Coordinate
5. Control

Obviously, when we look at his definitions in the exhibit they seem a bit old-fashioned, but with some modifications they still hold today. By applying Coase and chaos we can make these modifications.

“Forecast and plan” options

Chaos implication



The bifocal company

”Forecast and plan” options

A company can choose to work with its planning with a spectrum ranging from an extreme short-term orientation all the way through to a long-term orientation. By applying chaos theory to the different time horizons it becomes evident that the turbulence in many industries makes the medium-term inherently unpredictable. Think about the weather analogy. It is possible to predict tomorrow’s weather with some degree of accuracy (60 to 70 percent in fact), and it is possible to predict that there will be a summer next year. However, it is impossible to predict what the weather will be like 43 days from now.

The same applies in many industries. Short-term plans for the next few months or possibly up to a year make sense because the degree of accuracy of the predictions is fairly good. Long-term visions also make sense, as long as they are not too detailed. What falls in-between, for example traditional strategies, mainly make sense as an intellectual exercise but have limited real life value.

Personally, I have two observations that to me confirm this point of view. The first is that when reviewing a strategy that is one year old it is often quite irrelevant. Second, as discussed in for example *In Search of Excellence*, there seems to be no strong correlation between success and quality of strategy. I am sure we can all think of companies that are highly successful but can not be described in terms of good strategic thinkers.

You may ask if the implication of this is that a lot of the strategic work being done is more or less worthless. I would answer this question with a qualified *yes*. And the qualification is that the strategic exercise often is an excellent point for bringing management together and creating a common understanding. But as a blueprint for what a company should do in the future, strategies don’t serve a major purpose.

The implication of this is that managers should be bi-focal—excellent visionaries and hard-nosed doers.

Prescriptions for organizing the corporation

	Theoretical support Coase	Chaos
• **Buy as much as possible from the outside**	✓	✓
• **Decentralize the remainder to smallest possible unit**	✓	✓
• **Make all units into profit centers**	✓	✓
• **Build on core processes within units**		✓
• **Use temporary teams within processes**	✓	✓

Prescriptions for organizing the corporation

Fayol's second foundation stone of management was to organize the company. If we apply Coase and chaos to an organization we will see that there is only one way to organize in the future (although the rate of change obviously varies from industry to industry).

- *Buy as much as possible from the outside.* Coase tells us that market transactions will gain market share from internal transactions. Consequently, a company should always start with the hypothesis that it should not carry out most activities and tasks. In a chaotic system it is important to have flexibility. By buying from the outside the flexibility increases since small systems are more flexible than large systems and the choices increase.

- *Decentralize the remainder to the smallest possible unit.* Coase supports this since small units increase motivation. Chaos supports it since small units handle turbulence better than large units. (Caveat: the smallest possible unit differs widely from industry to industry. However, they are almost always smaller than what companies have today.)

- *Make all units into profit centers.* Coasian theory tells us that if we mimic the market place as much as possible internally, this will be efficient. From a chaotic point of view, profit centers make it easier to handle rapid changes in the market.

- *Build on core processes within units.* In a chaotic environment, it is essential for the company to work fast—short time to market, and short time to customer. Core processes help reduce time since they optimize the interfaces between functions and tasks. The Coasian support is somewhat weaker but at least it does not contradict the prescription: core processes will help reduce the cost of misallocation.

- *Use temporary teams within processes.* Coase supports this since it minimizes misallocation cost and increases motivation. Chaos supports it since in a chaotic environment no task is forever.

  Companies are moving in this direction. A few examples: Chrysler, PepsiCo (e.g. Frito-Lay), General Electric, and ABB. Sometimes, managers and consultants argue that decentralization and centralization move in waves. This is simply not true and the statistics prove it. The corporate world is becoming more and more decentralized, and the old functional organizations of the 1930s are disappearing. (Many years ago product followed function. Today, function follows product.)

One more observation: The theory predicts that we will see these changes first in turbulent industries (e.g. banking and government), and last in stable industries. Indeed, this is borne out empirically.

Command not viable

Coasian theory

High motivation necessary to maintain a corporation

+

Workforce increasingly educated and skilled

Chaos theory

Fast response increasingly important

Quick decision making necessary

Empowerment only long-term solution

Command not viable

The third task of management is in Fayol's words to "command." Once again, Coase and chaos tell us what to do in the future. From a Coasian perspective, we have seen that the cost of demotivation is significant and increasing. As the work force becomes increasingly educated and skilled clearly empowerment is the only long-term solution.

Chaos theory also favors empowerment. Fast response is critical in a turbulent environment, and this leads to the need for quick decision making. The only way to achieve this is to empower people all the way to the front line.

Thus, empowerment is not a passing fad even though it is a buzz word. It can be explained by applying basic theory. We will see more and more of it as the years pass.

Coordination principles

		Theoretical support Coase	Chaos
Communications: Invest in excellent knowledge transfer	• **Tele/video communications**	✓	✓
	• **Corporate jets**	✓	✓
	• **Small spatial distribution**	✓	✓
Information Systems: Apply subsidiary principle	• **Few corporate-wide**		✓
	• **Decentralized, tailor-made**	✓	✓
	• **Report only to necessary level**	✓	✓
	• **Available to everybody**	✓	✓

Coordination principles

The fourth task of management according to Fayol is to "coordinate." Coordination is a broad and difficult subject, but lets keep it simple. Let us only look at two practical aspects of coordination: communications and information systems. Then we can draw some abstract conclusions.

1. The governing principle for communications is to *invest in excellent knowledge transfer*. In particular in high value added knowledge transfer.
    - Tele/video/e-mail communications are supported by Coase since they reduce the cost of resource misallocation, and by chaos since they speed up decision making.
    - Corporate jets are essential according to Coasian theory since they make better use of management (and improve motivation). Chaos motivates corporate jets since they quicken decision making.
    - Small spatial distribution, i.e. having relevant people sit close together, is clearly supported by Coase and chaos without further explanation.

2. *Apply the subsidiary principle to information systems.* The subsidiary principle was articulated by the Vatican as a way of managing its far flung operations. Later, it was adopted by the Christian Democrats in Germany, who in turn made it popular within the European Community (at least in theory). The principle says that decisions should be taken at the lowest possible level in an organization, and not be carried to the top. When we apply this to information systems we find:
    - Chaos theory argues for few corporate-wide systems since
        a) large systems are inherently slow and bulky, and
        b) be appropriate in an ever-changing world.
    - Decentralized, tailor made systems are supported by Coase since they increase motivation and reduce resource misallocation, while the administrative costs of them decreases as technology improves. Chaos supports such systems since they increase flexibility.
    - Reporting should only be done to the necessary level. The theoretical support is obvious. Instead I offer an anecdote. I met the corporate Human Resources Manager of a very large company a few months ago, and I asked him how many employees the company had. He answered that he didn't know, and added "why should I know?" Indeed, why should he know?
    - Make information available to everybody. With Coase we see that this increases motivation and reduces resource misallocation. With chaos theory we see that it makes decision making faster.

In sum, we see a very different corporation evolving if we apply these principles and stretch our thinking on how to coordinate. As an executive at ABB put it: “When I hear the word coordination, I reach for my gun.”[3] Only those few activities that need coordination should be coordinated, and then fast. Most companies coordinate too much and too slowly.

[3] This is a paraphrase of Hanns Johst's (often wrongly attributed to Hermann Göring) notorious statement from 1933: “Whenever I hear the word culture…I release the safety-catch on my Browning.”

Two control models

Traditional

- **Top down**
- **Follows calendar**
- **Template driven**
- **Bureaucratic response (written)**
- **Punishment driven**
- **Slow**

Coase: No
Chaos: No

Modern

- **Top down**
- ***Ad hoc* in time**
- **Issue driven**
- **Person-to-person response (verbal)**
- **Reward and support driven**
- **Quick**

Coase: Yes
Chaos: Yes

Two control models

Finally, let's take a look at Fayol's fifth principle: to control the corporation. The traditional way to control managers is to follow a fairly standardized top-down approach which is characterized by annual cycles, follows a template (for example gross margin, delivery accuracy), uses a bureaucratic method where the information is printed out from a computer and is sent to the manager, builds more on punishment than reward, and is fairly slow.

Coase tells us this is not a good control model since it decreases motivation and increases resource misallocation. Chaos doesn't support it either since it is too slow for a turbulent environment.

Coase and chaos tell us that the modern way of controlling has to be much more flexible. First, I believe that control has to be top-down in any environment. But then things change. Control should be ad hoc in time and issue driven, so that corrective action can be taken quickly. It should be person-to-person in discussions rather than written. It should build on reward and support rather than punishment, and foremost, it should be quick.

Coase tells us this is correct for the opposite reason than above while it only marginally increases administrative cost. Chaos supports it since it is a dynamic and flexible model that works in turbulent environments.

We have now modified Fayol's foundation stones of management. Let's finally summarize them.

Five cornerstones of modern management

1. ***Set vision and plan***

   Define the long-term ambition and create the short-term plan of action

2. ***Organize***

   Build the structure of the corporation with the smallest possible units, and only with the necessary activities

3. ***Motivate***

   Empower people to maintain activity and deliver results

4. ***Coordinate***

   Bind together, unify and harmonize all the relevant activities and efforts

5. ***Control***

   Follow up performance and take necessary action by rewarding or correcting immediately

Adapted in 1991 from Henri Fayol (1916)

Five cornerstones of modern management

We now have a prescription for how to manage in a simple fashion and how to avoid the unnecessary complexities of management.

1. Set the vision and plan, and forget what happens in between.

2. Organize the corporation by getting rid of unnecessary activities and breaking up the remainder into the smallest possible unit.

3. Motivate employees by empowering them and make them deliver their own results rather than commanding them.

4. Coordinate by binding together, unifying, and harmonizing only the relevant activities and efforts, and get rid of the unnecessary coordination that paralyzes so many large corporations.

5. Control the managers in a positive fashion by following up quickly, and taking necessary actions through rewards when possible.

Modern management is simple. The reason I can say this with confidence is that when we look around we see it happening everywhere. The only thing I have done here is to articulate it in a somewhat different manner.

"One can't believe impossible things", Alice said.
"I dare say you haven't had much practice", said the Queen.

One can’t believe impossible things...

This quote from Alice in Wonderland is quite appropriate. What I have described in this presentation is just common sense. The reason it may be difficult to accept is that we don’t have much practice in thinking the impossible.

Slides

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20. One can’t believe impossible things...

Further readings

Coase:
The Nature of the Firm; edited by Oliver E. Williamson and Sidney G. Winter (Oxford, 1991)

Chaos:
Chaos—Making a New Science; James Gleick (London, 1987)

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