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15.912 Technology Strategy
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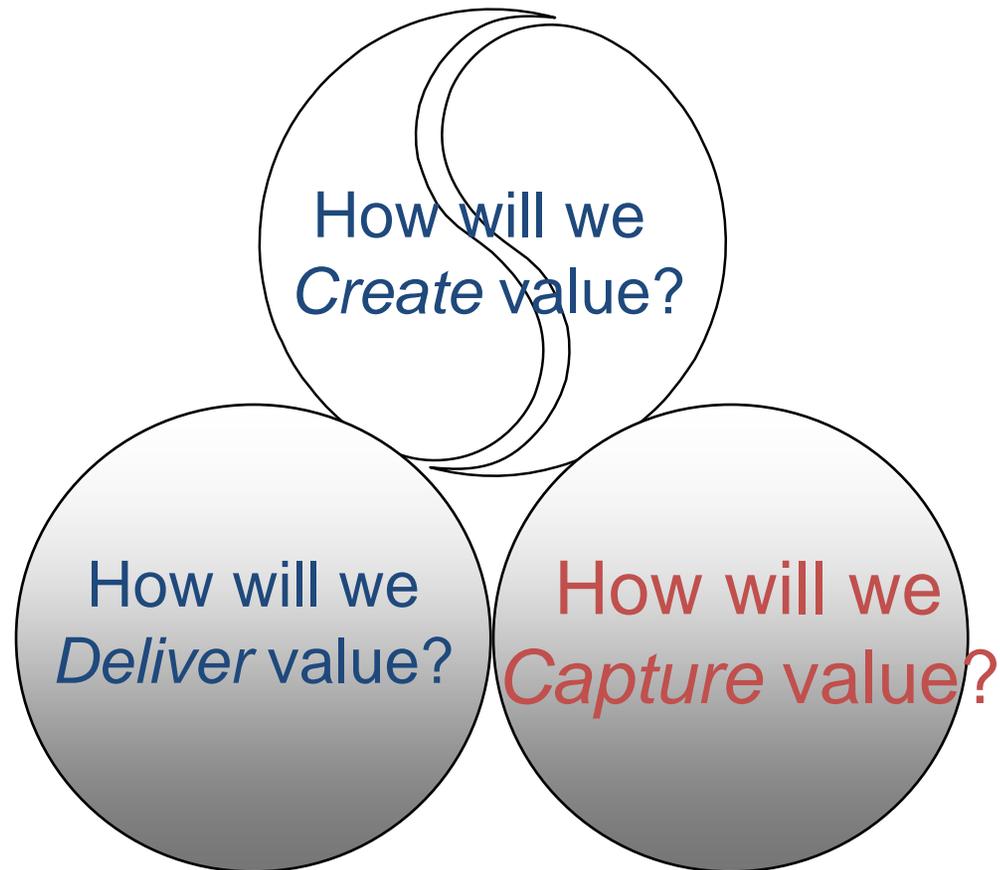
Uniqueness and Complementary Assets

Professor Jason Davis

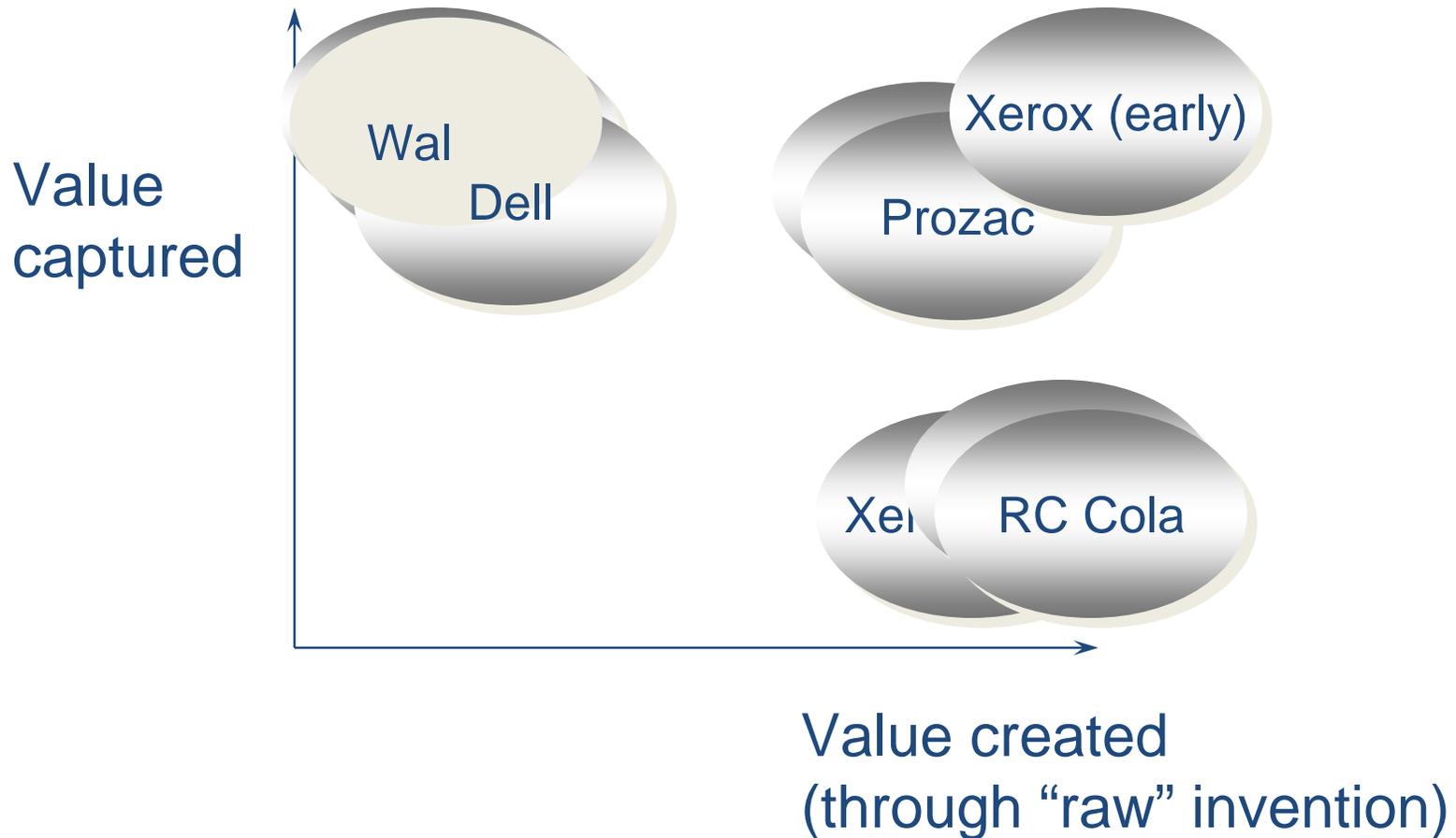
MIT Sloan School of Management



The second of two key questions:



Is it the case that great ideas = pots of money?



Economist's View of the World:

- Everybody's out to eat your lunch...
 - How can you fight back?
- 
- Value Creation is not enough...
 - ...you need to Capture some of that value to stay in business.

Three key ideas:

- Uniqueness
 - Controlling the knowledge generated by an innovation: being the only game in town
- Complementary Assets
 - Controlling the assets necessary to exploit the knowledge generated by innovation
- Five Forces
 - Understanding the dynamics of power in the value chain

Uniqueness is very important:

- If a particular innovation, or the knowledge on which it rests, can be completely “appropriated” then the innovating firm may be able to maintain a unique position. This is a tremendous source of bargaining power.

Sources of Uniqueness

- Intellectual property protection
 - Patents
 - Finite length
 - The right to prohibit “producing”
 - Copyrights
 - The right to prohibit “copying”
- Secrecy
 - Trade secrets & non compete clauses
 - “Tacit” knowledge
- Speed

Intellectual property protection

- Strengths
 - Legal right
 - Can be traded
 - Buys time to build complementary assets
 - Provides temporary monopoly
 - Slows competitors down
- Weaknesses
 - Disclosure requirements
 - Costly to enforce
 - Can be invented around
 - Could be too short
 - Not everything can be patented
 - False sense of security

The Intermittent Windshield Wiper

- 1962: Robert Kearns invented a little switch that made the intermittent wiper possible
 - Fitted car with it and drove it to Ford
 - Ford passed on innovation
 - Kearns obtained patents
- 1969: Ford and others cracked secret
- 1990: Kearns wins suit against Ford for potential damages payout of \$ 325 million (eventually gets \$ 8 million).

Secrecy

- Strengths
 - No disclosure
- Weaknesses
 - Difficult to maintain
 - Non-compete clauses are costly to enforce
 - Good technical people do not want their work shrouded in secrecy

What kind of innovation tend to rely most on secrecy?

- When the innovation is in process. Steel, paper, textiles. Light bulbs, for example. There are Siemens plants that you cannot go into even if you are a Siemens employee from another division. They make light bulbs in very high volume, and all the knowledge resides in the process technology, and it's shrouded with secrecy. Why? Because you can keep secrets like that in principle. It's only a few employees, and you pay them to stay. And the secret elements are not evident from the product itself. Contrast the CT scanner with the light bulb. If I give you a light bulb, there is no information about how it was made.
- Why don't these few employees just leave and set up their own firm? Because you need huge economies of scale to compete with Philips, GE, and Siemens. They use secrecy in combination with complementary assets.

Speed

- Strengths
 - Competitors cannot catch up
 - Costly to imitate
 - Quick profits
- Weaknesses
 - Over soon
 - Diminishing returns
 - Difficult to sustain
 - Difficult to pull off/Treadmill
 - Dissipates industry profits

Speed

- There is some evidence that in some industries, the move to speed has in fact destroyed industry profitability. Only the customers benefit.
- Moving towards speed as the primary mechanism for appropriability may be dangerous, particularly if you have no long-term way of making sure that it is going to stay your edge. If you had a choice, you would rather not compete on breakneck speed, just like you would prefer to compete on advertising rather than on price if you are Coke and Pepsi. I am aware that this is counter-cultural. Speed advantage may be very temporary, and create a bunch of long-term problems.
- I am not suggesting that companies should be slow. All I am suggesting is that you think a little bit before moving to speed as the foundation of your appropriability strategy. It can be extraordinarily powerful, but you want to think about two things: (1) can we sustain it? and (2) will we build something as we go fast that will in the long-term enable us to gain competitive advantage? I recognize that you may have no choice. There are a whole bunch of people who make a living on speed. Management Consultants, for instance: *“Come up with yet another framework, go out, sell the framework, Woops, that one’s obsolete, let’s get another framework.”* Because there is no other way!

Unfortunately Knowledge is Often Very Difficult to Appropriately

- Legal mechanisms can be costly to create, and then even more costly to enforce: and sometimes they require public disclosure
- Secrecy is hard to maintain
- Even tacit knowledge often gets diffused
- Knowledge is often difficult to “chunk”
 - Value is created by a collection of advances
 - Many benefits are delayed
 - Many benefits are diffuse

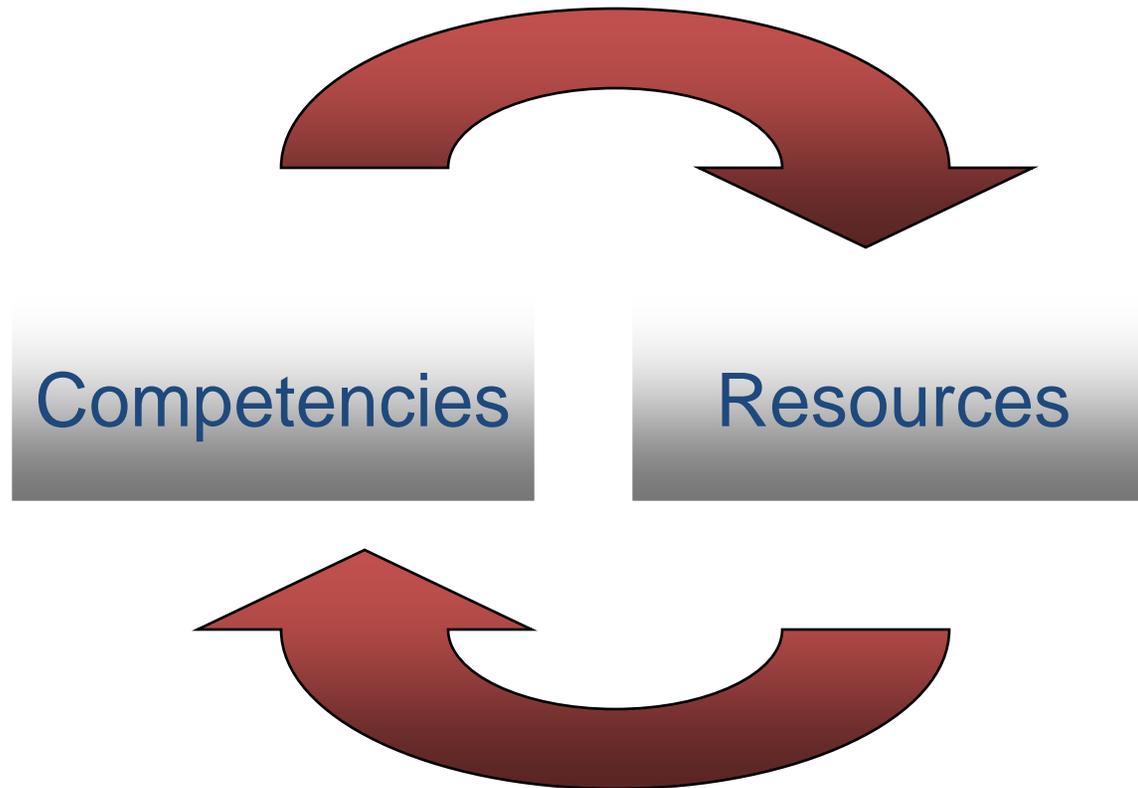
Complementary Assets: Definition

- Those assets that allow a firm to make money, even if the innovation is not unique:
- The answer to the question:
 - If our innovations were instantly available to our competitors, would we still make money? Why?

What kinds of Complementary Assets provide Advantage?

- Things you can do
 - Manufacturing capabilities
 - Sales and service expertise
 - Competencies
- Things you own
 - Brand name
 - Distribution channels
 - Customer relationships
 - Resources

In successful firms, competencies create resources, and vice versa:



In the best case, complementary assets should be *tightly held*

- Complementary assets that are tightly held are not easily available to entrants or to most competitors

Complementary Assets and Incumbent Survival in the Typesetter Industry

- Waves of innovation
 - 1440: manual, Gutenberg
 - 1886: ‘hot metal’ linotype machine, Mergenthaler
 - 1949: analog phototypesetting
 - 1965: digital CRT phototypesetting
 - 1976: laser imagesetting
- One firm, Mergenthaler Linotype, survived as industry leader

Mergenthaler's success

- 1895: recognized need for new font development
- 1902: library of over 100 fonts
- 1913: 1000 typefaces
- 1923: 2000 typefaces
- Would take 20 years for an entrant to duplicate (with computers, it took Compugraphic a decade and \$23 million to generate 1000 fonts)
- Key fonts trademarked: “Helvetica”
- Did not suffer commercial consequences as a result of their inferior technological positions.
 - Suffered only when both competence was destroyed and the value of specialized complementary assets was diminished.

Effect on Specialized Complementary Assets

Generation	Specialized Manufacturing Capability	Sales & Service Network	Extensive Proprietary Font Library	Devalue Specialized Complementary Assets?
Hot Metal	<i>High value</i>	<i>High value</i>	<i>High value</i>	<i>N/A</i>
Analog Phototypesetter	<i>Much lower value than prior generation</i>	<i>Much lower value than prior generation</i>	<i>Same value as prior generation</i>	<i>Yes</i>
Digital CRT phototypesetter	<i>Same value as prior generation</i>	<i>Same value as prior generation</i>	<i>Same value as prior generation</i>	<i>No</i>
Laser imagesetter	<i>Same value as prior generation</i>	<i>Same value as prior generation</i>	<i>Same value as prior generation</i>	<i>No</i>

How can we assess whether we control specialized complementary assets?

- Suppose that innovation had been developed by an “external” start-up team
 - Would the start-up consider you the ideal partner?
 - Are there any capabilities for which it is necessary to approach a partner? A potential competitor??

Who makes money when:

Complementary assets are:

Freely
available

Tightly
held

Uniqueness is:

Easy to
maintain

Hard to
maintain

Who makes money when?

Complementary assets are:

Freely
available

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Uniqueness is:

Easy to
maintain

The Inventor's
Dream

It Depends!

Hard to
maintain

No One!

The Asset
Owner

	Freely available	Tightly held
Easy to maintain	The Inventor's Dream	It Depends!
Hard to maintain	No One!	The Asset Owner

Exercise

Position:

Frozen foods

Publishing

Cameras

Music Distribution

Easy to
maintain

Uniqueness is:

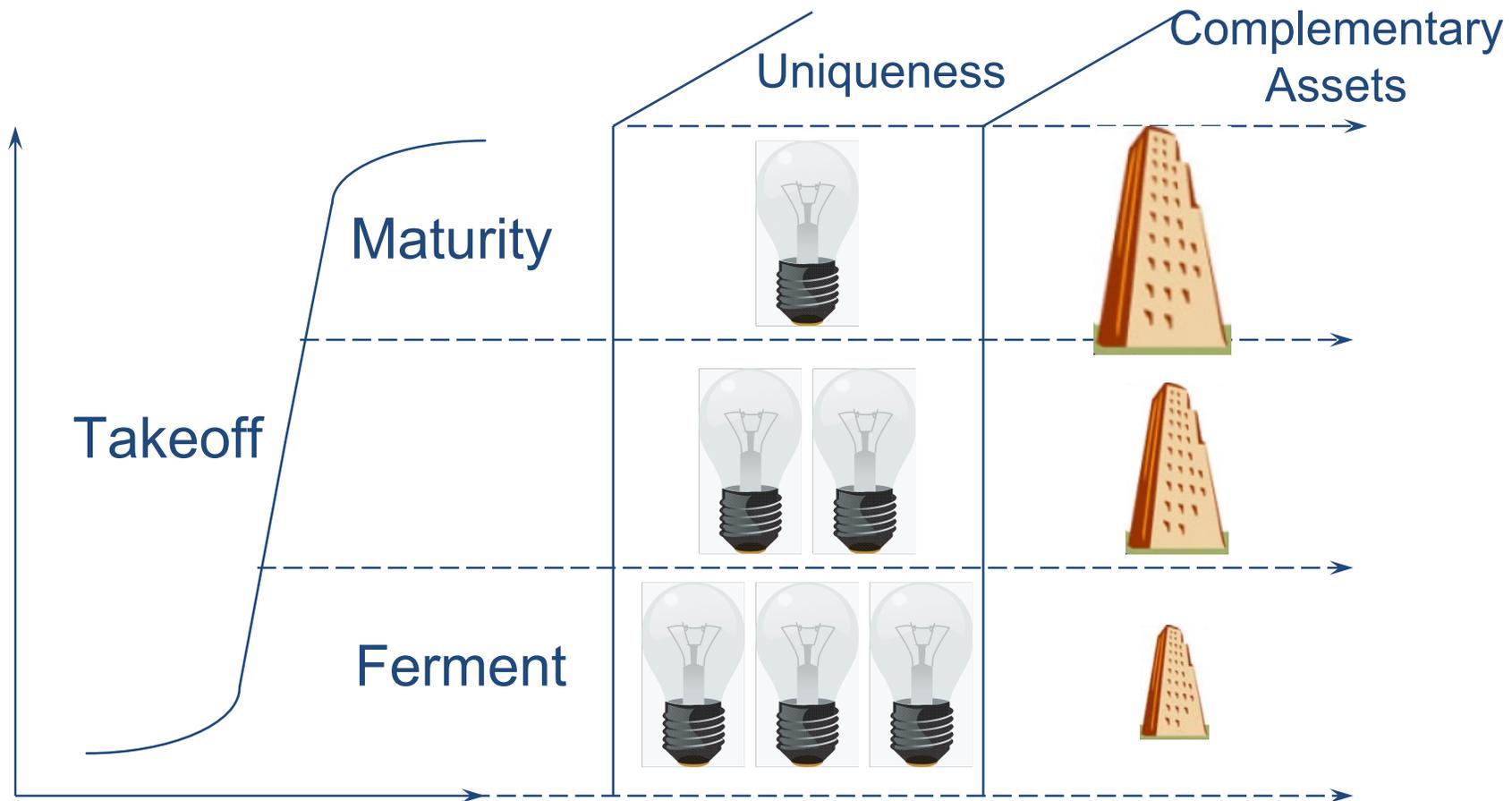
Hard to
maintain

Complementary assets are:

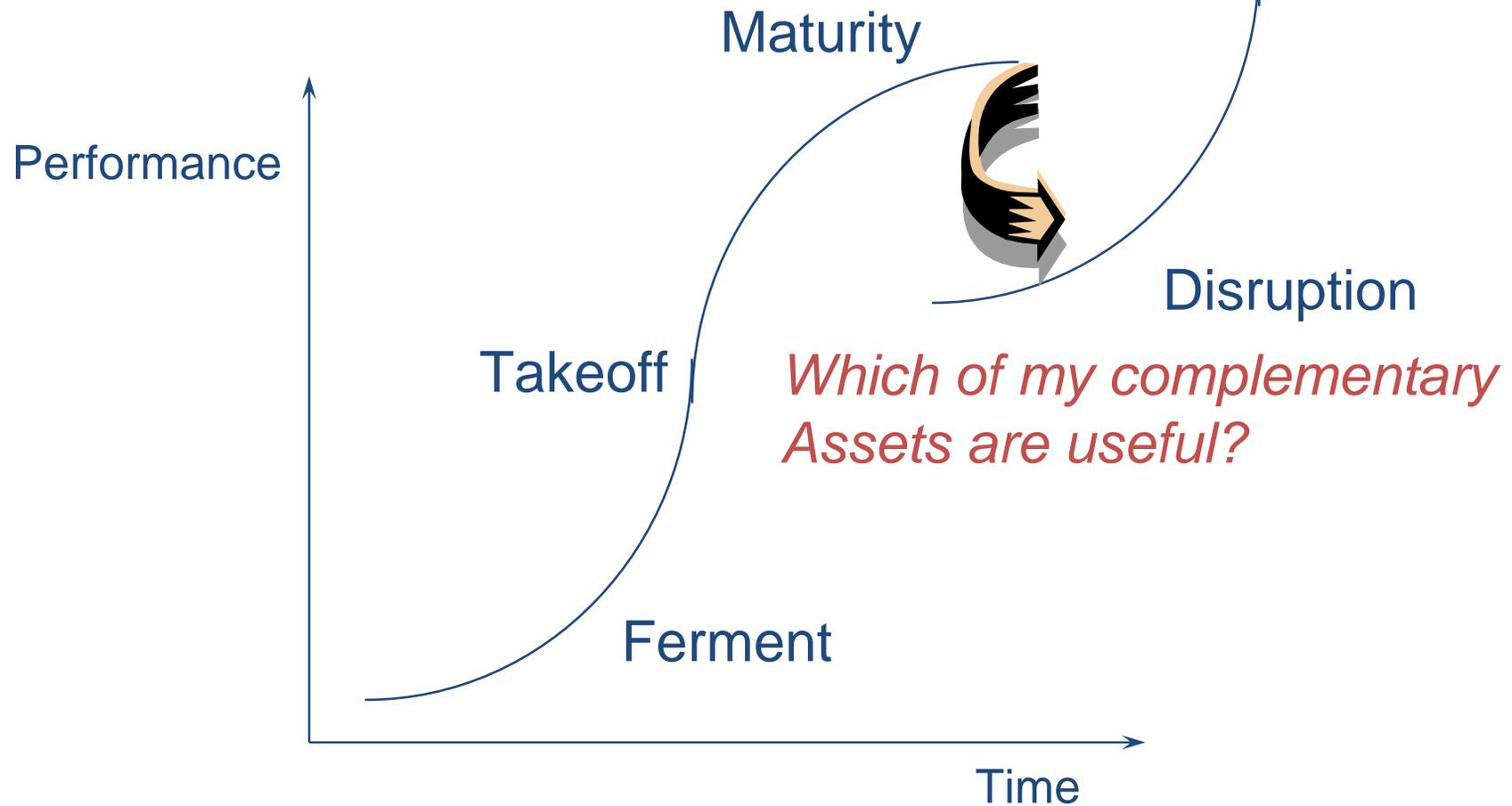
Freely
available

Tightly
held

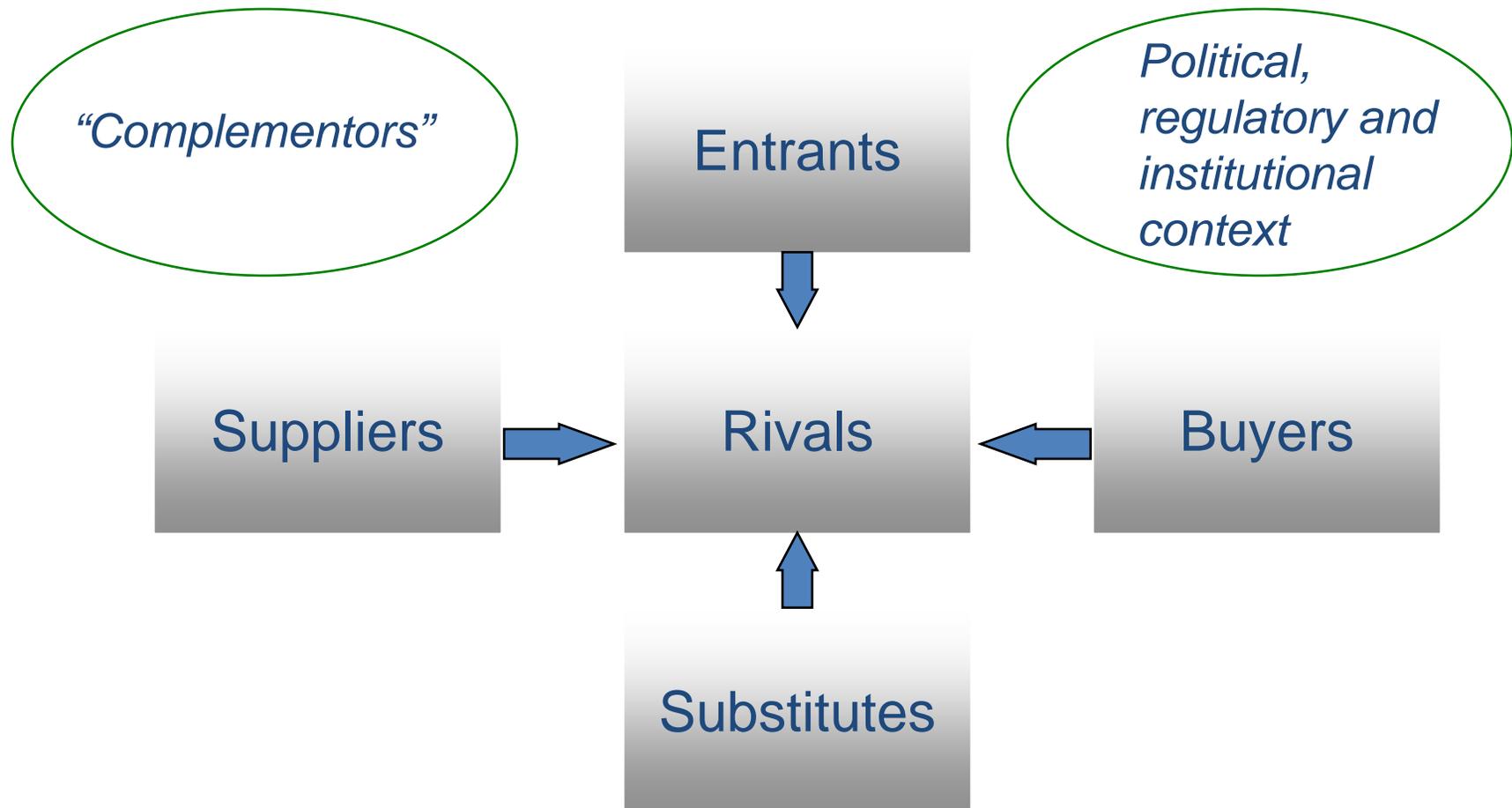
Uniqueness & Complementary Assets over the Life Cycle:



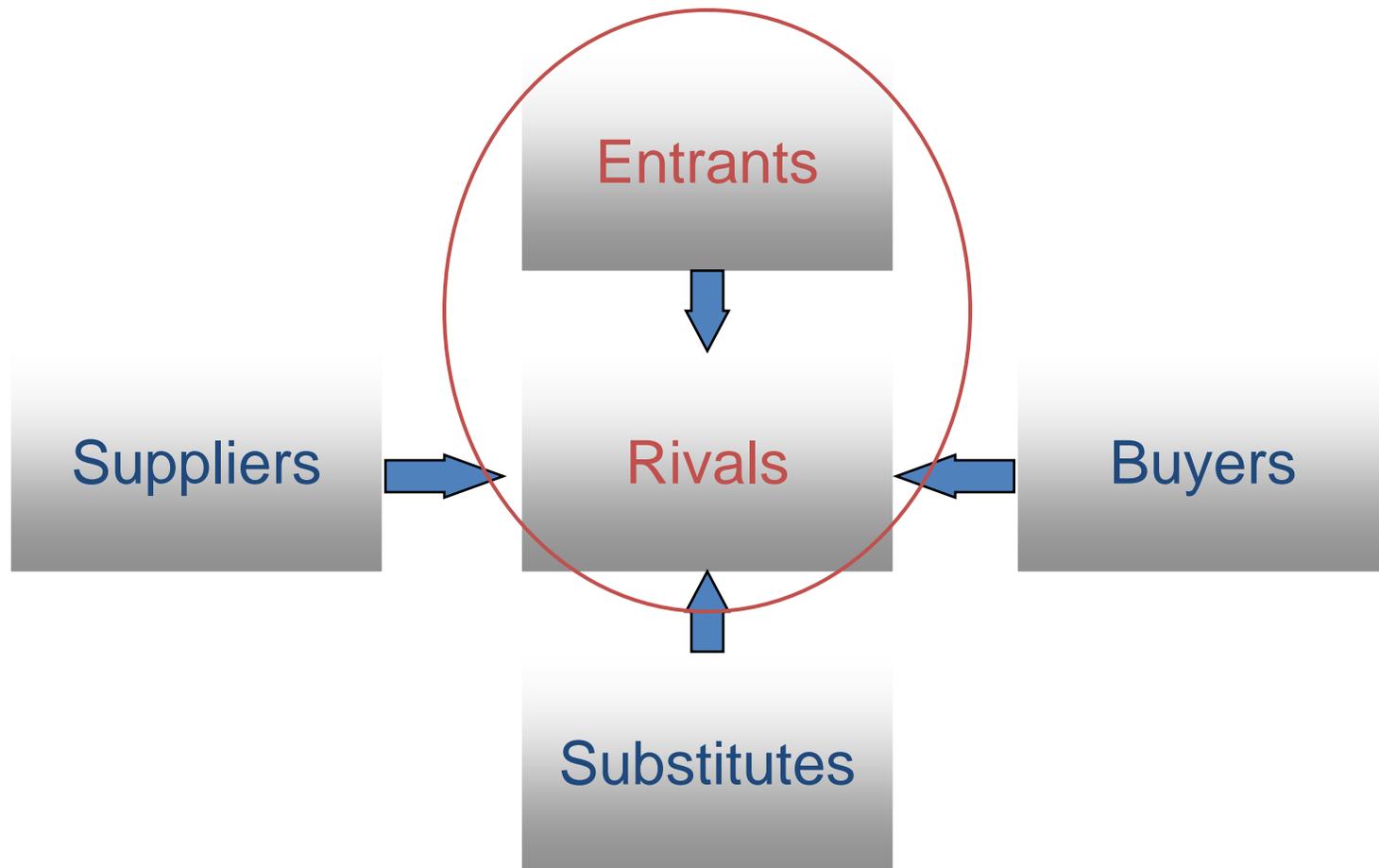
Managing disruptions means managing complementary assets:



Porter's "5 Forces": Thinking about the balance of power



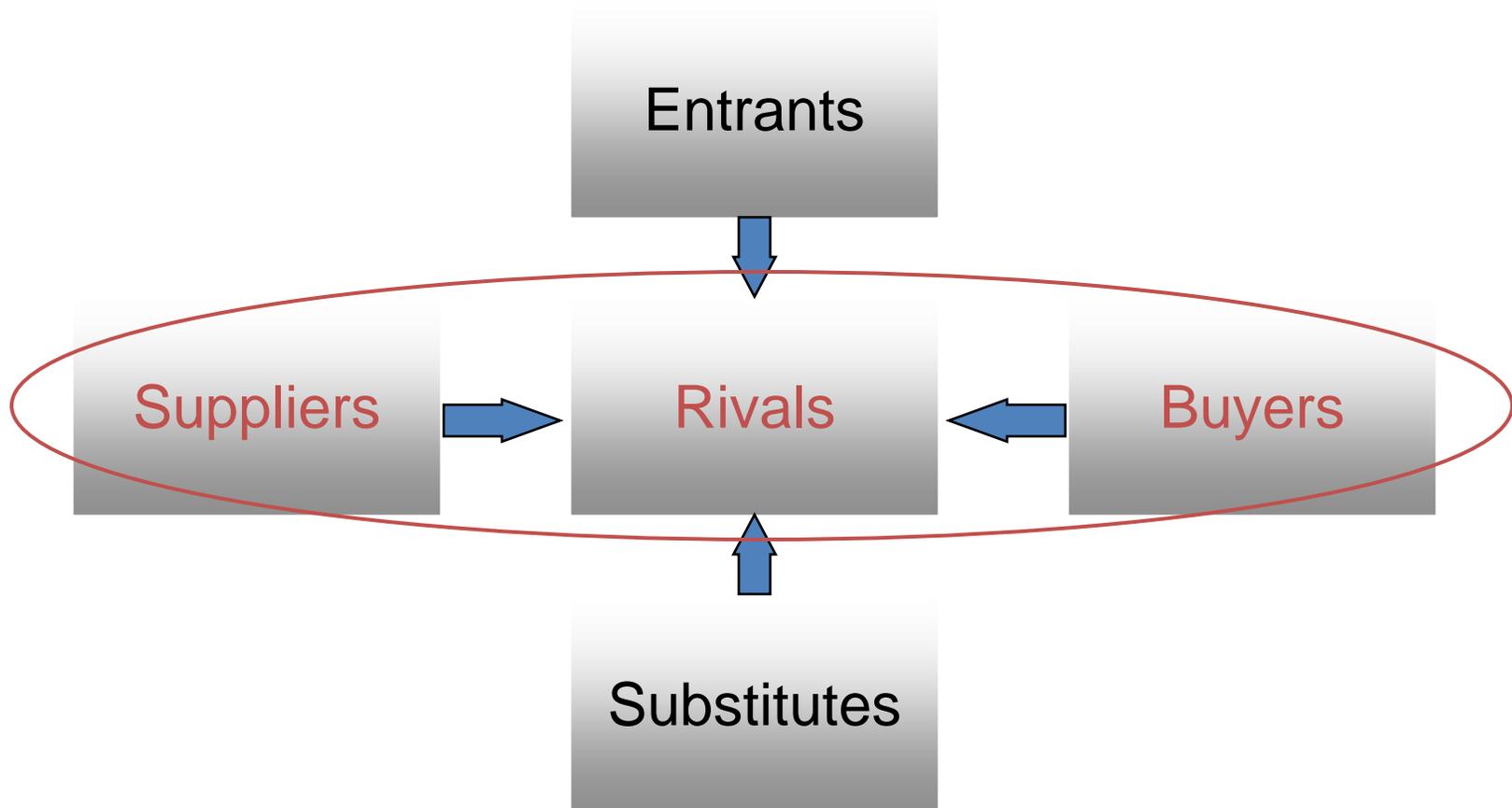
C. Assets/Uniqueness speak to Rivalry and the Threat of Entry.



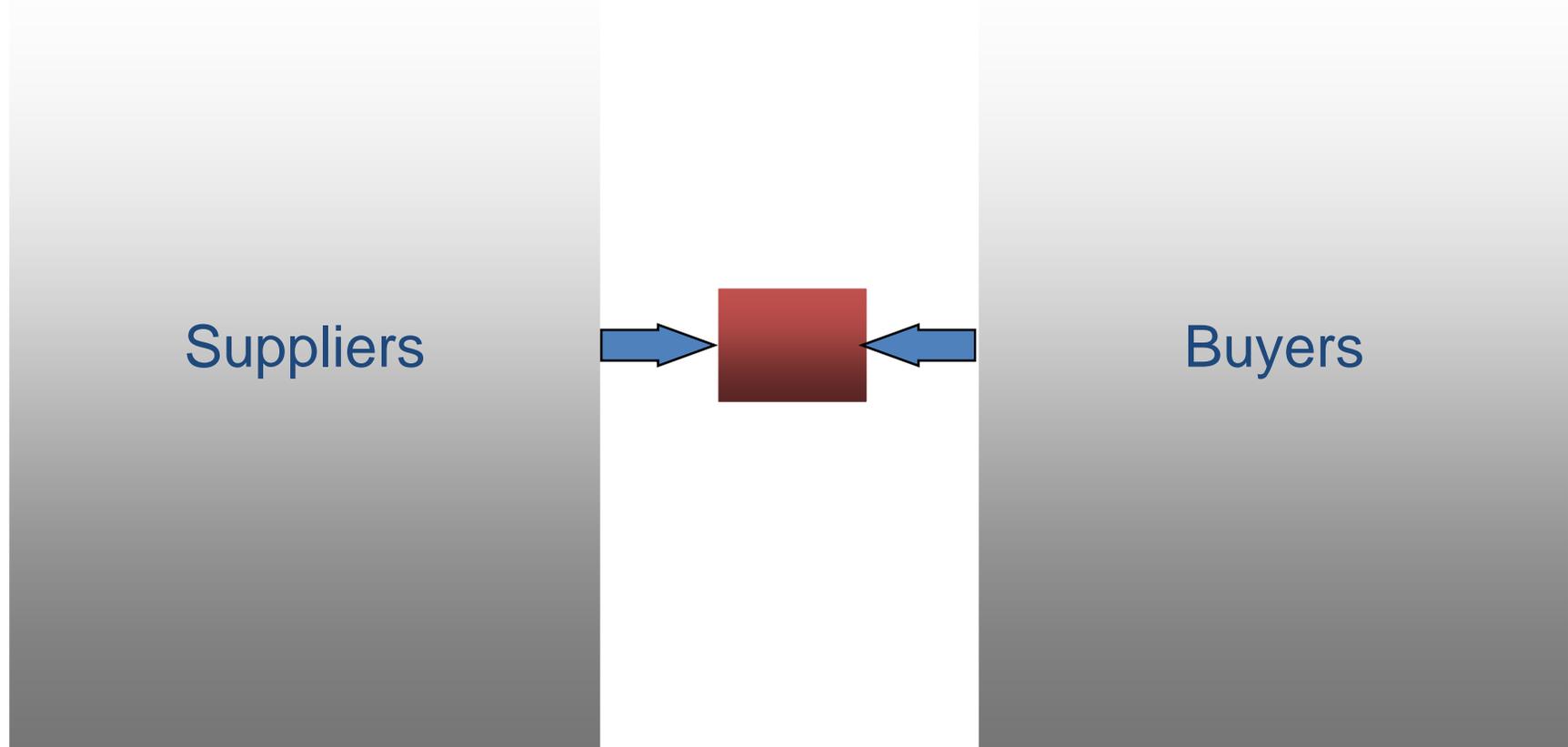
Porter's Five Forces

- A tool for thinking about the distribution of power in the value chain
- Appropriability and Complementary assets speak to **Entry** and **Rivalry**
- But 100% appropriability, or complete control of complementary assets will not necessarily allow you to extract full value from an innovation if:
 - Substitutes are easily available
 - You must negotiate with “powerful others” in the value chain

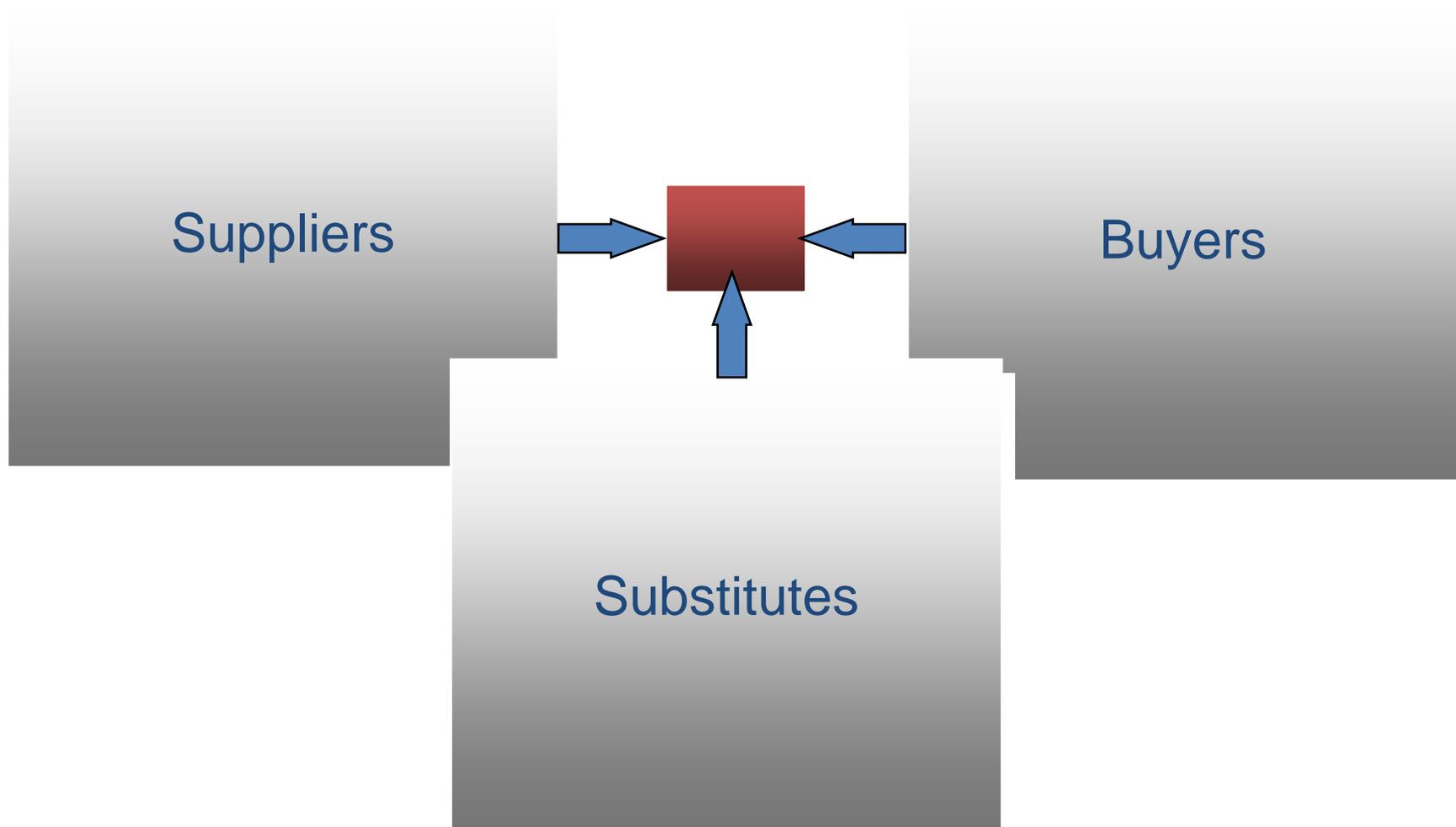
Porter reminds us to think about the structure of the value chain:



Powerful suppliers and buyers may constrain profitability



So may increasingly viable
substitutes



Making money from Innovation: Summary

- Creating value is not enough:
- It is important to capture value as well
- Value can be captured through a variety of mechanisms, including uniqueness and complementary assets
- Value capture strategies change over the life cycle
- Technology strategy and business strategy should thus be intimately linked

Looking Forward:

- Ember & the Dynamics of Standards-based competition
 - Should they integrate into Chip Manufacturing?
Why or why not?