L. 20 & 21: The Right Game & "Co-opetition"

- I. "It's a game, Jim, but not as we know them."
- 2. Your Added Values.
- 3. The Game of Business.
- 4. Changing the Game.
- 5. Changing the Players.
- 6. Changing Added Values.
- 7. Changing the Rules.
- 8. Changed Perceptions
- 9. Changing the Scope.
- 10. Checklists for Change.
- 11. Traps for Young Players.
- 12. Pascal's Wager.

1. "It's a Game, Jim, but Not as We Know Them"

Business is a game, but different from structured board games or arcade games or computer games:

- > it is not win-lose (not zero-sum): possible for all players to win
- > apart from the law, there is no rule book
- > others will change the game to their advantage
- > the game is made up of five PARTS (see below)
- > success comes from playing the right game

So game theory provides a framework for an everrapidly changing world.

Competition and Cooperation

Competition:

how to get a bigger piece of an existing pie.

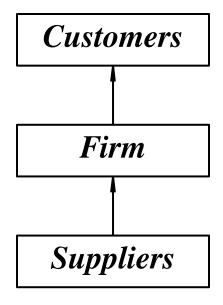
Cooperation:

how to increase the size of the pie.

 \rightarrow Co-opetition

1.1 The Value Chain

The business buys from its suppliers and sells to its customers.



Companies compete to dominate one or more stages of the chain.

Write down your organisation's Value Chain.

1.2 Complementors

Every business has

- > customers
- > suppliers
- > competitors
- ➤ and ?

Business strategy frameworks often overlook the role of complements.

Brandenburger & Nalebuff suggest a new term — complementor — for firms that provide complements.

Customers, suppliers, and complementors can all be partners with the business.

Firms can be complementors with respect to their customers and with respect to their suppliers.

Customers and Complementors

Examples of customer's complements:

- > computer hardware and software
- > The Core 2 Duo chip and Microsoft Vista
- > Cars and roads
- > Selling cars and car loans
- > Sweets & masks and Hallowe'en
- > Red wine and Dry cleaners
- > ISDN phone lines and videophones
- > Golf courses and real estate
- > desktop colour printers and digital cameras
- > TV and TV Week
- > the Internet (Broadband) and?

Complementors v. competitors. (Customers)

A firm is your competitor if if customers value your product less when they have the other firm's product than when they have your product alone.

e.g.? Coke and Pepsi?

A firm is your complementor if if customers value your product more when they have the other firm's product than when they have your product alone.

e.g.? Fine wine and Riedel glasses?

Customers' Complementors

Technical definition:

Two businesses A and B are complementors with respect to a customer if the customer's willingness to pay (WTP) for both of their products together is greater than WTP for A's product alone plus WTP for B's product alone:

WTP
$$(A & B) > WTP(A) + WTP(B)$$

Suppliers and Complementors

Examples of supplier's complements:

- > supplying wheels to car majors
 - even if different wheels, less costly if there are two or more customers.
- > HP and Dell
 - compete with each other for the latest Intel/AMD chip
 - complement each other in defraying Intel/AMD's R&D costs
- > Virgin and Qantas
 - compete with each other for passengers, freight, landing slots, and gates
 - complement each other in defraying Boeing's or Airbus' R&D costs

Complementors v. competitors. (Suppliers)

A firm is your competitor if it's less attractive for a supplier to provide resources to you when it's also supplying the other firm than when it's supplying you alone.

e.g. Accounting firm and "Chinese walls"

A firm is your complementor if it's more attractive for a supplier to provide resources to you when it's also supplying the other firm than when it's supplying you alone.

e.g. wheel manufacturer — lower AC with 2 car-maker customers

Suppliers' Complementors

Technical definition:

Two businesses A and B are complementors with respect to a supplier if the opportunity cost (OC) for supplying both of their products together is less than the OC of supplying A's product alone plus the OC for supplying B's product alone:

$$OC(A & B) \leq OC(A) + OC(B)$$

Specialising in supplying goods to firms A and B.

Common and Proprietary Complements

Create a market by cooperating with competitors to develop Common Complements:

- ➤ In the U.S. in 1913, General Motors, Hudson, Packard, and others formed the Lincoln Highway Association to build "seedling miles".
- > IBM, Compaq, Sun, Netscape, Oracle, and others created a \$100 m Java Fund.
- > IBM, Hewlett Packard, Intel announced a joint development laboratory for Linux.

Proprietary complements.

By offering Proprietary Complements, a firm gains a competitive edge.

Help customers to get existing complements at the right time and at a good price:

- > Ikea and kids' play areas
- > Bookshops and coffee bars
- > Holden's and GMAC credit
- Credit cards and airlines (FlyBuys)
- > Bundles and suites of software (may reduce total price too)

The flip side of complements.

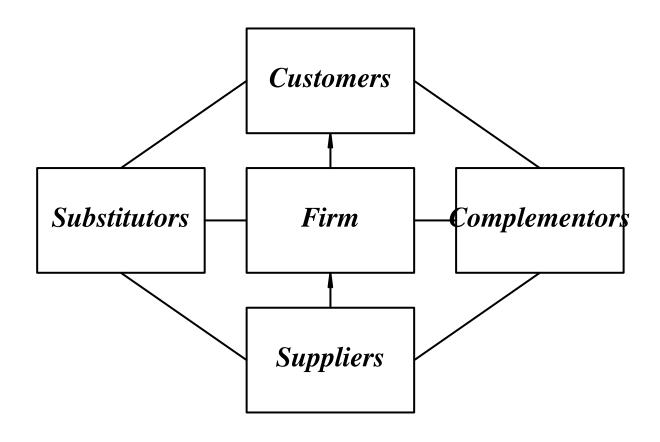
But: the flip side of complements:

your product makes someone else's much more valuable:

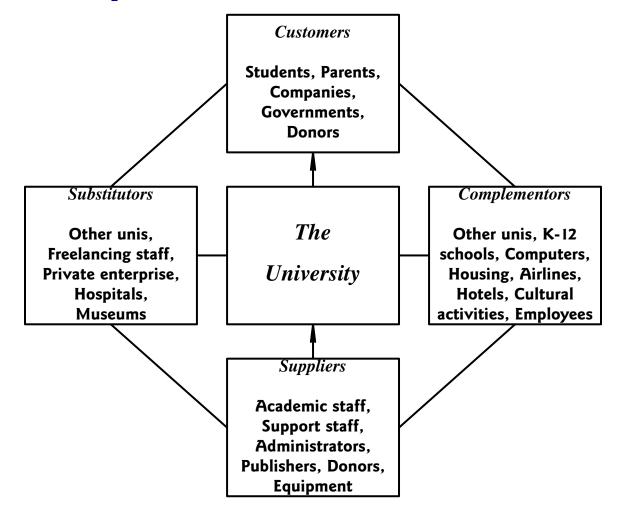
- > railways and land
- > IBM and Microsoft/Intel
- > transport improvements and real estate

1.3 The Value Net

Brandenburger & Nalebuff extend the Value chain to include the firm's complementors and competitors:



The University's Value Net.



The Value Net is useful.

The Value Net is:

- > a complete map of a firm's relationships
- > a counter to limited thinking (e.g. "outsmart the competition")
- > a prompt to understand a firm "outside-in"
- > a shared template for discussions of strategy.

What is/are your Value Nets? (Use the template handed out.)

Competition or Cooperation?

Kodak and Fuji create the Advanced Photo System (APS or Advantrix):

- > Cooperation:
 - Creating a new market for an easy-to-use, flexible camera system
 - Joint product development
 - Joint development of processing systems
- > Competition:
 - Competing for sales within the market
 - Continuing competition in traditional markets
 but create potential for cooperation

1.4 From Lose-Lose to Win-Win

Business has elements of competition and cooperation:

- > cooperation to generate the pie
- > competition over dividing the pie.

Example.

- e.g. Intel's strategy on the Value Net:

 Only the paranoid survive Andy Grove, CEO
 - > Competitor strategy: continuous innovation.
 - > Customer strategy: Intel Inside campaign.
 - ➤ Complementor strategy: partnership with MCI, H-P, etc.; internal development of the PCI bus, ProShare, ... the Merced chip with Hewlett Packard Linux development with H-P and IBM a new chip with Palm etc.

Multiple roles: Jekyll & Hyde.

Your complementors often help your competitors too.

Why?

Competitive threat or Complementary opportunity?

- > Cinemas and video rentals.
- > Traditional and Internet booksellers.
- > computers and paper
- > ATM machines
- > computers and the Internet
- > Napster, iTunes, iPod and the CD music companies
- > Broadband ISPs and video/movie companies

Q: What business is the NRMA/AA/AAA in?

- > Roadside assistance?
- > Insurance?
- > Travel?
- > Buying club?
- > Financial services?
- > Discounts?
- > Used car quality inspection?
- > Touring information?
- > Smash repair advice?

A: The complements business!

Multiple roles: Making markets.

- > Antique shops in Queen Street, Woollahra.
- > Theatre, music, and dance on and off Broadway, N.Y.
- > Universal Studios, restaurants, hotels, factory outlets, and Disney World in Orlando, Florida.

Complementors in making the market,

Competitors in dividing the market

Friend or foe?

Friends Customers, Suppliers, Complementors

Foes Competitors

? No

BOTH!

The competitive mindset.

- > The bias:
 - Customers and suppliers have to choose between opportunities with us and with others.
 - We're taught to think in terms of constraints, trade-offs, substitution.
- > To correct the bias: -

Think complementor as well as competitor.

Cooperate in order to ...

- > Cooperate to compete better
 - buying conditions
 - selling conditions
 - tax regimes
- > Cooperate to create value
 - create new markets
 - share risk, knowledge
 - build complements
 - establish standards

Competing and cooperating.

- > Air versus land
 - hotels need airports airports need hotels
 - allied or conflicting interests?
 - consumer cares about: $P_a + P_h$
 - but each complementor wants the other's price to be lower
- > Solutions.

Want competition among your complementors — keeps their prices low and so maintains demand for your product.

but

Want high prices among your competitors — for the same reason.

2. Your Added Value

Two sorts of interactions:

- structured: "Look forward and reason back"
- unstructured (free-form) such as business:
 "You can't take away more than you add." often.

Your added value: what difference does your participation make? Your added value, which disappears when you do.

Exercise: The Card Game 2. (over)

Put yourself in the others' shoes in order to design a game that is right for you.

Your strategy: actively shape the game you play, not just playing the game you find.

2.1 Value-Added Games

The Card Game 2

- > I have 40 black cards
- > 40 students each have I red card.
- > A pair comprising an intact red card and black card together is worth \$100 from the Dean, say.
- > But now it's a free-form negotiation between me and each student, (not take-it-or-leave-it, as in CG I in Exercises D).
- > Who will get what?

The Card Game 3

Same as Card Game 2 (each student has I red card), but:

- > Now I tear up 3 black cards
- > The pie is smaller by \$300
- > Are we all worse off?

Why did I tear the cards up, instead of just stating that I was only going to play 37 cards today?

Example?

Added value.

Your added value =

the size of the pie with you in the game

minus

the size of the pie without you in the game.

It's what you bring to others.

What you can get is based on your added value.

Can you get more than your added value?

Zero added value \Rightarrow get zero, but see Tactics later.

Added-Value analysis of Card Game 2

- > My added value is \$4,000
- > Each student with a red card has added value of \$100
 - ∴ your total added value is \$4,000
- > The game is symmetric

Added-Value analysis of Card Game 3

- > My added value is now \$3,700
- > But each student's red card has zero added value
- > So I do much better

A bigger piece of a smaller pie.

2.2 A Quiz: Added Value

Which company had the largest market value (in 1990–91) on the Tokyo Stock Market?

- A. Sony
- B. Nissan
- C. Nintendo

A quiz.

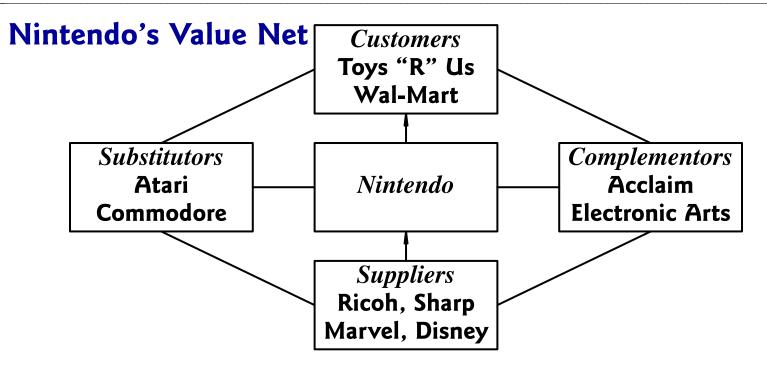
Which company had the largest market value (in 1990–91) on the Tokyo Stock Market?

A. Sony 2.2 trillion Y

B. Nissan 2.0 trillion Y

C. Nintendo 2.4 trillion Y

By withholding consoles and cartridges from retailers (and so from consumers), Nintendo in effect torn up some of their cards, and destroyed value added in the short run in order to improve their bargaining position and so their profits. (They didn't need to actually destroy their hardware, just withhold it from sale.)



Customers under-supply \rightarrow destroy their added value

Complementors internal development \rightarrow lower their added value

Suppliers old chips \rightarrow commodities;

new characters - Mario - lower the added value of Dis

Substitutors positive feedback loop

Nintendo: ¥ 2,400,000,000

Sony: ¥ 2,200,000,000

Nissan: ¥ 2,000,000,000

Co-opetition:

Looking not just for win-lose (zero-sum) opportunities, but also for win-win (positive-sum) opportunities.

Win-lose opportunities often backfire:

- e.g. lowering price to gain market share
 - ... temporary benefit, but gains evaporate if others match
 - → new status quo at lower prices (lose-lose)

Competitive threat or Complementary opportunity?

- Cinemas & video rentals
- Computers & paper

3. The Game of Business

The stakes are too high to be left to chance.

The Value Net: a map representing all players in the game and their interdependencies.

Interaction in two dimensions:

Vertical: the firm's customers and suppliers

Resources: suppliers \rightarrow company

Products and services: firm \rightarrow customers

Money: customers \rightarrow firm \rightarrow suppliers

Horizontal: other players, but no transactions;

the firm's substitutors and complementors.

Horizontal players.

Substitutors: alternative players:

- from whom customers may purchase products
- to whom suppliers may sell their resources
 e.g. Coke and Pepsi: rival sellers

Complementors: players:

- from whom customers buy complementary products
- to whom suppliers sell complementary resources
 e.g. hardware & software

Many interdependencies.

Several hats are possible.

The Value Net: various roles of players possible (Qantas & SAL) to be in more than one role.

Two fundamental symmetries:

- 1. vertically, between customers and suppliers, and
- 2. horizontally, between substitutors and complementors

Substitutes and complements.

Intuitively, only vertical dimension a mix of cooperation (getting together) and competition (dividing the pie).

Along the horizontal dimension?

- > substitutors seen as enemies
- > complementors seen (if at all) only as friends

But there can be:

cooperative element to interactions with substitutors, as in the GM credit card case, and competitive elements with complementors

The Other Guy's Irrational — Not!

- Profits may not be the only objectivepride, jealousy, fairness may matter
- > Ignore this, and all players may lose e.g. WWI "impossible": too much to lose
- > Even if you think others are misguided, don't project your rationality on them:

Imagine ...

Imagine yourself in the shoes of the other players, in order to:

- assess your added value
- anticipate their reactions to your moves
- see how they see you (James Stewart in the Frank Capra movie It's α Wonderful Life).

Rationality doesn't require:

- > our preferences are the same
- > our information is the same
- > our perceptions/beliefs are the same

Or: apparent irrationality can be explained by different preferences, or information, or perceptions/beliefs.

4. Changing the Game

Value Net prompts for all dependencies.

- I. Drawing the Value Net is the first step towards changing the game
- 2. Identifying all elements of the game:

players, added values, rules, tactics, and scope (P.A.R.T.S.)

PARTS will describe all the interactions.

To change the game, you must first change one or more of these elements.

Write down who the fundamental players are for your organisation.

Write down who the peripheral players are for your organisation.

PARTS

Players: customers, suppliers, rivals (substitutors), allies (complementors);
Change any, including yourself.

Added Values: what each player adds to the game (taking the player out would subtract their added value).

Ways to raise yours, or lower theirs.

Rules: give structure to the game; in business — no universal set of rules from law, custom, practicality, or contracts Can revise exiting rules, or devise new ones.

More PARTS ...

Tactics: moves to shape the way:

- players perceive the game, and hence:
- how they play

Tactics to reduce misperception, or to create or maintain misperception.

Scope: the bounds of the game: expand or shrink.

PARTS does more than give a framework, it also provides a complete set of levers.

PARTS provides a method to promote non-routine thinking.

Now, let's change the P.A.R.T.S. ...

5. Changing the Players

Becoming a player changes the game for the others.

The NutraSweet Case:

Players: Coke, Pepsi, Monsanto, Holland Sweetener Co. (HSC)

Monsanto's patent on NutraSweet (aspartame) used in Diet Coke and Pepsi was due to expire (earlier in Europe than the USA).

Coke encouraged HSC to build an aspartame plant in Europe, which led to a price war between HSC and Monsanto in Europe over aspartame.

But just before the U.S. patents were due to expire, both Coke and Pepsi signed long-term contracts with Monsanto.

Was Coke serious about HSC? What did Coke and Pepsi accomplish?

So: Sometimes the most valuable service:

is to create competition

so don't do it for free

Get paid to play — in the takeover business.

The BellSouth Case:

Players: Lin Broadcasting Co. & McCaw & BellSouth.

- 1. Seeing strong synergies, in 1989 McCaw bid \$120/share for Lin, whose shares jumped from \$103.50 to \$129.50.
- 2. Lin was hostile, and McCaw lowered its bid to \$110; Lin sought other buyers BellSouth.
- 3. Lin promised BellSouth \$54m anyway and an expense cap of \$15m if BellSouth's bid lost.
- 4. BellSouth bid between \$105 and \$112; McCaw bid between \$112 to \$118; BellSouth raised to \$120/share; Lin raised BellSouth's expense cap from \$15m to \$25m.
- 5. McCaw raised to \$130+/share and offered BellSouth \$22½m to stop bidding; Lin acceded and was taken over by McCaw.

So: Even if you can't make money in the game the old-fashioned way, you can get paid to change it.

Pay me to play in your game.

Need not be in cash —

guaranteed sales contract
R&D contributions
bid preparation expenses
last-look provision, or MTCC
(Meet-the-Competition clause)

Competition is valuable

Don't give it away –

Get paid to play

How to get paid.

- > Cash, of course
- > Contribution of upfront expenses
- > Guaranteed sales contracts
- > A last-look provision, or MTCC
- > Access to people who know
- > Access to information
- > Bids on other pieces of business
- > A price at which the customer would give you his business
- > Contributions towards bidding expenses ...

Hidden Tendering Costs for Businesses

(Assume you're competing to sell, not to buy: lowest bid is most attractive).

- > You're unlikely to succeed there are better uses of your time.
- > When you win the business, the price is so low you lose money. (Winner's Curse: good news and bad news)
- > The incumbent can retaliate you end up trading low-margin for high-margin customers.
- > Win or lose, you establish a lower price existing customers will want a better deal.
- > New customers will use the low price as a benchmark.
- > Rivals will use the low price you helped create as a benchmark.
- > It doesn't help to give your customers' competitors a better cost position.
- > Don't destroy rivals' "glass houses."

Changing Players.

e.g. Lin paid to bring in an extra player (customer).

e.g. Coke & Pepsi would have paid HSC to become a second supplier.

e.g. McCaw paid to take out a rival bidder (substitutor).

Case: 3DO Video Games (cheap complements)

3DO planned to make money by licensing software houses to write games for 3DO hardware (from \$3/CD sold).

To get very cheap game consoles, 3DO gave away licenses to the hardware — to Panasonic, Sanyo, Toshiba, Goldstar (LG) — cheap complements to 3DO software.

Eventually, offered hardware manufacturers 2 shares of 3DO/console sold, and increased the royalty per game sold to \$6. Now: 3DO is just a software developer.

Paying people to compete in the complements market.

Complementors not only friends, also rivals.

Legitimate win-lose opportunities with complementors.

6. Changing Added Values

Your added value =

the total value with you

minus

the total value without you.

It's what you bring to others.

What you can get is based on your added value.

Raise yours.

TWA "Comfort Class" Case:

Reduced seats to increase space in economy

→ more comfort & higher load factors (less likely to start a price war)
What if others copy this? Then they all win.

And lower your rivals' value added.

(See Card Games 3 & 4 in exF.)

http://www.agsm.edu.au/bobm/teaching/ThS/exF-3.pdf

- e.g. Nintendo trumped every player in its Value Net.
- e.g. Power Beer v. Alan Bond's newly purchased XXXX in Brisbane

Sources of Added Value.

- > Generic strategies
 - \rightarrow Value Chain
- > Scarcity
- > Think: big picture
 - \rightarrow step outside the Value Chain
- > Complements
 - creating new ones
 - getting them more cheaply
- > Perceptions versus reality
- > Product differentiation
 - relationshipse.g. skiing

Added Value of credit cards:

- > Protection
 - mail order
 - dishonest merchants
 - defective products
- > Information
- > Record keeping
- > Convenience
- > Liquidity
- > Prestige signal (of platinum)
- > Loyalty points (FlyBuys)
- > Issuer as agent

Your Added Value.

Protecting your added value.

In freewheeling interactions (business):

 no player can take any more than that player adds to the game,

but:

- no guarantee that any player will get all of its added value.
- even if you have no added value, that doesn't stop you from making money — others might be willing to pay you to enter or exit the game.
- 3. rules constrain interactions among players in games with rules, some players may be able to capture *more* than their added value.

7. Changing the Rules

Rules: limit the possible reactions to any move

Rules come from:

- > custom, tradition, social norms
- > contractual arrangements
- > the government (laws)

In interactions with rules, you need to anticipate the reactions of others to your actions.

To analyse the effect of a rule:

Look forward and reason back.

Kinds of rules.

Simplest rule: one price for all.

- > new player enters a market
- > new player limited capacity (clear, credible)
- > incumbent match price or lose share
- > judo economics: keep small as entrant
 - e.g. Kiwi Airlines (less than 10% of capacity), Virgin Blue (before the Ansett collapse)

Contract-Based Rules

- 1. Most-Favoured-Customer (MFC)
- 2. Meet-The-Competition (MTC) clauses ("last look" or bid)
- 3. take-or-pay agreements
- give structure to the negotiations

1. Most-Favoured-Customer (MFC) clauses.

Under a MFC clause, a supplier undertakes to give the favoured customer (MFC) a price at least as low as the best price given to its other customers.

So a discount to any customer requires a discount to the MFC too. (Card Game 4)

How do MFCs change the game?

- ➤ makes discounting "expensive" (the price effect)∴ a tendency for prices to remain both rigid and higher
- facilitates price-fixing arrangements between customers by acting as a signalling mechanism (collusion effect)
- > raises barriers to entry (entry effect)

Most Favoured Customer Clauses

The price effect:

- > a supplier has less incentive to negotiate prices with individual customers
- > customers, equally, have less incentive to negotiate price reductions since their rivals would also benefit
- > MFC clauses guarantee cost parity, and discourage selective price cutting by suppliers, maintaining higher prices
- .. a credible commitment not to compete on price

Most Favoured Customer Clauses

The collusion effect:

- > suppliers will less likely cheat on MFC clause by acceding to customer pressure to lower their prices
- > MFC clauses facilitate competitor coordination by signalling to its competitors a firm's commitment to less-aggressive conduct, so allowing industry prices to rise

2. Meet-The-Competition (MTC) clause, or "last look".

Case: Carbon dioxide CO₂ with MTC

- a commodity, but very expensive to transport
 - \rightarrow value-added for proximity
 - \rightarrow value-added for reliability of supply, service, etc.
 - \rightarrow the producer can capture more than added value
 - ... gain for incumbent
 - & gain for challenger: prices higher
 - because no undercutting, and no price war.

Meet-The-Competition or "last-look" clauses

- A preferred seller will always have the right to match the lowest bid that another seller offers.

MTC: coopetition & customers may gain with long-term relationship

MTC enhanced by imitation: the more the merrier (higher price)

Rules can be changed, but beware: It's the added value \rightarrow power to write rules.

A Smith & Wesson beats a straight flush.

Changed players, added values, rules.

Now, perceptions: uncertainty pervasive \rightarrow behaviour.

- > Perceptions of the world, whether right or wrong, drive behaviour.
- > Tactics are actions taken to shape other players' perceptions.
- e.g. Murdoch at the New York Post lifting the fog about the cost to both papers of a price war.

See

http://www.agsm.edu.au/bobm/teaching/SGTM/perceptioncartoom

Agreeing to disagree?

Bank Case: a fee negotiation over selling a client firm — at what price?

The client's optimistic (\$500m), but the bank's pessimistic (\$250m).

... the bank proposes a fee of 1%, but \$5m is too high for the client. (1% of expected \$500m)

The bank proposes a fee of 0.625% with a guaranteed minimum of \$2.5m.

The client expects \$3.125m, the bank expects \$2.5m — both happy!

e.g. The Texas Shoot-out or Savoy Clause (see exF handout) —

http://www.agsm.edu.au/bobm/teaching/ThS/exF-3.pdf different valuations

Foggy, mixed, or clear?

- > Lifting the fog.

 The peacock's tail: credibly signalling.
- Preserving the fog.Negotiation, asymmetric information
- > Stirring the fog.

Telstra v. Optus (AGSM's John Roberts in the HBR, Nov 2005)

9. Changing the Scope

- > Is PARTS the whole?
- Recognise links between games e.g. Epson in laser printers
- > Links can occur through:
 - players
 - added value (complements)
 - rules (MFC)
 - perceptions (threats, precedents)
 - e.g. Nintendo's 8-bit Mario v. Sega's 16-bit Sonic

Links between games.

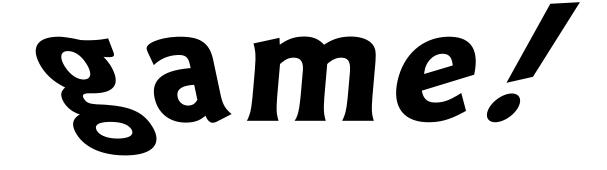
- > Added-value links.
- > Rules can link games.
- > Perceptions can link games.

Think big.

There is

always a

larger



- 10. Checklists for Changing the Game.
- 10.1 Questions to Change the Players
- > What is your Value Net?
- What are the opportunities for cooperation and competition?
- > Would you like to change the dramatis personæ? Which new players would you like to bring into the game?
- > Who stand to gain if you enter? Cui bono? Who stands to lose?

10.2 Questions to Change the Value Added

- > What is your added value?
- > How can you increase your added value?
- > Can you create loyal customers and suppliers?
- > What are the added values of the other players?
- > Is it in your interest to limit their added values?

10.3 Questions to Change the Rules

- > Which rules are helping you and which are hurting you?
- > Which rules would you like to have in contracts with your customers and suppliers?
- > Do you have power to make rules?

 Does someone have the power to overturn them?

10.4 Questions to Change the Tactics

- > How do other players perceive the game?
- > How do these perceptions affect the play?
- > Which perceptions would you like to keep?
- > Which ones would you like to change?
- > Do you want the game to be more transparent or more opaque?

10.5 Questions to Change the Scope

- > What is the current scope of the game?
- > Do you want to change it?
- > Do you want to link the current game to others?
- > Do you want to unlink the current game from other games?

11. Traps for Young Players

- 1. Don't just accept the game you're in.
- Don't believe that changing the game must come at others' expense;
 Co-opetition: look for win-win and win-lose
- Don't believe that you mustn't be imitated uniqueness is not necessary for success.
- 4. Don't fail to see the whole game, complementors especially see the Value Net.
- 5. Think methodically about changing the game use PARTS, and put yourself in the others' shoes.

And, there's no end to the game of changing the game.

"Chance favours the prepared mind."

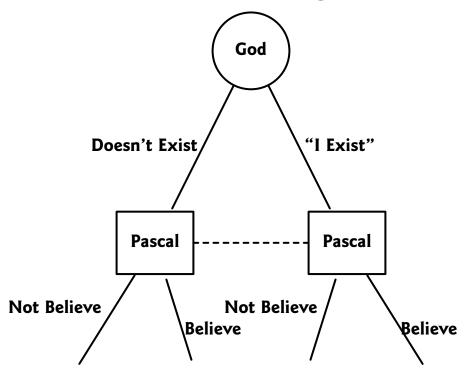
Louis Pasteur (1822–1895) said:

"Le hasard ne favorise que les esprits préparés"

Game theory may not always predict accuractely how others will act or respond, and so may not always solve your problem of how to act or respond, but ...

If you're more aware of the possibilities, then you'll be better prepared for the opportunities!

Pascal's Wager



Pascal's Dilemma: To Believe in God or Not

Blaise Pascal (1623–1662) was one of the pioneers of probability theory, who later retreated to life in a monastery.