

Chapter 1

Network Advantage: Making the Stealth Bomber



Does this airplane look like it can actually fly¹? During World War II, many in the U.S. military grappled with this question, but the XB-35 bomber, which was completed in 1948, eventually became the prototype for the B-2 Stealth Bomber that rules the air today. The development of the Stealth Bomber is a fascinating and instructive story about its creator, Jack Northrop, and the power of alliance networks.

In his time, Jack Northrop was considered to be *the* aerospace genius. He dominated aviation innovation in the 20th century, creating a wide spectrum of aircraft which established many design principles still in use today. His most famous design was the flying wing concept, which eliminated

¹ Picture from <http://upload.wikimedia.org/wikipedia/commons/0/0f/XB-35.jpg>

the fuselage and was unparalleled in aerodynamic efficiency. It represented a large step forward in aviation design. In 1941, Northrop secured a contract with the U.S. military to develop his design into an aircraft that could influence the outcome and duration of WWII, but he was unable to deliver on his promise and the project was deemed a failure. It was a commercial disaster.

In 1980, Jack Northrop, then age 85 and confined to a wheelchair, visited a secure facility to see the first B-2 Stealth Bomber—the most advanced military aircraft capable of flying at extremely high altitudes and avoiding radar detection. Even after 40 years of technological development and use of sophisticated computer design tools, the new bomber looked like a replica of Northrop's original design. Reportedly, after seeing the aircraft, Northrop said he now realized why God had kept him alive for so long.²

Jack Northrop's dream was realized, but not under his watch. Now, you may think this story is about technological advancement. You may say that Northrop's project required technologies that did not exist at the time, but were developed long after Northrop's failed attempt. This intuition is correct, but underlying the technology, this story is actually one of alliances. It took a particular type of alliance portfolio built among several organizations to turn Northrop's dream into reality. The ultimate success of the Stealth program is a testament not only to Northrop's technological genius, but also to how alliance networks influence behavior, innovation, and performance.

A Tale of Two Attempts

Let's look at this story in more detail. The flying wing debuted in 1929. Its design minimized the aerodynamic force that opposes the plane (drag) and maximized the force that kept the airplane in the air (lift). The intuition was that the conventional airplane fuselage creates drag and would fall down if not for the wings which create lift; the flying wing design eliminated the fuselage and was "all wing." These features gave the flying wing design a strong aerodynamic advantage as compared to the alternatives. In 1941, Jack Northrop's aviation company contracted with the U.S. Army Air Corps to transform his X216H flying wing design into a long-range bomber. The contract specified that

² See the Aircraft Market Place blog at www.acmp.com/blog for details on Jack Northrop's flying wing design and for more details on the Stealth program development see Withington, Thomas. (2006). "B-2A Spirit Units in Combat." Osprey Publishing Midland House, Oxford, and Pape, Gary and Campbell, John. (1995). "Northrop Flying Wings: A History of Jack Northrop's Visionary Aircraft." Schiffer Publishing.

Northrop would deliver one bomber, to be named the XB-35, by 1943 at a cost of \$2,910,000 (approximate value today of \$44,464,800).

Northrop's company needed help to accomplish the project and formed alliances with three organizations that had complementary resources. This is what these partners did:

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|-----------------------|--|
| Otis Elevators | <ul style="list-style-type: none"> • Dedicated 350 draftsmen to work on design and performance issues. |
| General Manufacturing | <ul style="list-style-type: none"> • Participated in the manufacturing process and provided production facilities. They |
| Convair | <ul style="list-style-type: none"> also helped solve implementation issues. |

Figure 1.1 shows a picture of the resulting alliance network. In later parts of this book we use a lot of computer-generated graphics to show different network structures established between different firms. However, for the analyses you will do for your own firm, you can draw simple network pictures by hand. To show how simple this is, in this chapter we begin with hand-drawn pictures of the Stealth Bomber network.

In these figures, we use circles to represent firms and lines to represent alliances between them. The presence of a line between Northrop and General Manufacturing means that the two companies work with each other in an alliance. The absence of a line between General Manufacturing and Convair means that they did not have an alliance at the time of their collaboration with Northrop.

--- Insert Figure 1.1 about here---

The partners soon faced obstacles. They quickly learned through the development process that maneuvering such an aircraft without a traditional tail section was difficult, and they realized that the bomb payload and range were insufficient to meet U.S. military requirements. In addition, the XB-35 project suffered from manufacturing capacity problems. Because the design required new manufacturing processes and strict engineering tolerances, Northrop maintained a relatively small manufacturing facility and group of experts responsible for turning the design into a working bomber. While the tasks required precision, the partners also had short deadlines and ran into production issues. In the end, the project and alliances failed to overcome these problems and deliver a useable bomber

on time or within budget.

The maiden voyage of the XB-35 occurred on June 25, 1946, three years after the promised delivery date and long after the end of WWII, at a cost that was 400% over budget. Not only was it late and expensive, but it was also ineffective as a bomber: the XB-35's 3,500-mile range was well below the 6,000-mile requirement. The plane couldn't carry the conventional 22,000-pound bombs. And, due to steering problems, its average bomb miss rate exceeded 3,000 meters. In 1950, the U.S. military cancelled the entire program and dismantled the existing planes.

Northrop was a genius. Remember? While the first attempt was deemed a disaster, the potential of Northrop's design warranted another attempt, and the flying wing bomber program was resurrected in the early 1970s, well after Jack Northrop had retired. There was another noticeable difference: the number and structure of alliances among key players were more complex, which was in line with the complexity of the final product. Figure 1.2 shows the alliance network that literally took the Stealth Bomber project off the ground.

--- Insert Figure 1.2 about Here---

Northrop and Boeing, the companies that won the military contract, formed alliances—which we also refer to as their **ties**—for different purposes:

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|------------------|--|
| Vought Aircraft | <ul style="list-style-type: none">• Designed and manufactured the intermediate sections of the wings. |
| General Electric | <ul style="list-style-type: none">• Designed and manufactured a non-afterburner version of the F10 engine used in the F15. |
| Boeing | <ul style="list-style-type: none">• Handled fuel systems, weapons delivery and landing gear. |

These main partners worked collectively to negotiate technical standards and solve integration issues. In addition, each of these main partners formed individual ties with other subcontractors specific to their areas of responsibility. The result was a technical marvel. The B-2 Stealth bomber was capable of flying at an altitude of 50,000 feet covering a range of 10,000 nautical miles and was able to penetrate practically any air-defense shield undetected. Two B-2 Stealth bombers could do the work of 75 conventional aircrafts. In short, it was a game changer³!



What made the second attempt so successful? Having studied alliances, we can point to the network pictures and explain how Northrop's 1940's alliance portfolio made cooperation and integration difficult. In contrast, its 1970's alliance portfolio contributed to better idea integration and fine-grained information sharing which led to developing better manufacturing know-how. What had changed from the 1940's? Why did these ties allow more innovation to address the payload, range, and steering issues? Alliance management skills may have evolved by the 1970's, and they may have been lucky that more reasonable people were negotiating alliance terms, but we doubt such small changes would have been decisive. Instead, what had changed since the 1940's was the structure of Northrop's ties. The 1970's alliance portfolio was a key factor to fostering cooperation, and it had that effect not because of any difference in the quality of people involved in the alliances, but rather

³Picture from http://upload.wikimedia.org/wikipedia/commons/d/dc/US_Air_Force_B-2_Spirit.jpg

because of the structure of how these firms were connected to each other. Jack Northrop understood aviation structures, but he was unable to design an alliance network structure that could help achieve his vision.

The Principles of Network Advantage

Network advantage is actually not a complicated concept. As you've probably experienced already, networks are powerful and pervasive factors in all aspects of peoples' social lives. In fact, you likely make decisions every day based on your personal networks. Do you use your personal contacts to gain introductions to others who have useful information? Have you worked on a task force that brings together people with different expertise? Both situations demonstrate how to use your personal network to generate more value than would be gained from each individual relationship. No matter what kind of network, certain principles apply. We've translated these principles for use with understanding alliances. But, now let's put the Stealth Bomber example aside and look at how the network advantage principles apply using a person-to-person network.

Consider this study of family doctors in a small community in the United States.⁴ Each doctor was asked to identify other doctors they turned to for advice, they discussed cases with, or they saw socially. The network depicted in Figure 1.3 shows the doctors' responses. Each numbered dot represents a doctor. The lines show how the doctors are connected to one another. Now, put yourself in the shoes of a senior VP of marketing for a major pharmaceutical company which sells an antibiotic. Your life is far from easy because there is increasing regulatory pressure to curb marketing spending on specific activities such as taking doctors to dinners and conferences. So, to influence the doctors you need to be creative.

If you looked at this picture, would it provide you clues for maximizing the return on your efforts to influence these doctors to write prescriptions for your company's product? Would you spend the same amount of marketing time and money on each doctor or be more discriminating? If you only had enough budget to market to a handful of doctors, which ones would you target?

⁴ We rarely study networks of persons, so for this example we use a very famous study of networks: Coleman, J. S., Katz, E., & Menzel, H. (1966). *Medical innovation: A diffusion study*. New York: Bobbs-Merrill.

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This picture can help you answer these questions by identifying the most influential doctors—those who have the greatest number of linkages to other doctors and those who had the best chance to influence the largest number of other doctors based on their positions in the network. If you already had this answer in your head, it means that you understand the basic network concept. This map of social relationships shows that some doctors have greater influence on the behaviors of other doctors in the network. Doctor #048 has 15 arrows pointing toward him meaning he is a direct source of advice for 15 doctors. Doctors #013 and #081 have 10 and 7 such ties, respectively. Assuming these doctors discuss cases involving medication choices with their peers, it would be prudent to invest a disproportionately larger amount into marketing your products to them. Less obvious but worth noting is Doctor #094. This doctor interacts with four doctors, #78, #13, #81, and #48 who collectively interact with 34 others. Network research consistently shows that influence does not stop at direct linkages but can ripple across the network. Thus, influencing Doctor #094 can have a profound influence on the behaviors of other doctors in the network despite her only having four other doctors she interacts with directly. That is bang for your buck and that is network advantage.

To unlock the advantages inherent in any network, it’s important to understand the six key principles of network advantage which are summarized in the box below and come to life through the examples used in this chapter.

Six Key Principles of Network Advantage	
#1	Links among alliance partners transfer information, cooperation, and power.
#2	Even though networks transfer information, power, and cooperation, these advantages are not evenly distributed within the network.
#3	Success comes to firms that actively manage their alliance portfolios.
#4	It’s important to recognize the different mechanisms at play in the first, second, and third degree perspectives and be able to shift across these perspectives in designing your alliance portfolio.
#5	Network advantage accrues to those firms which are best positioned in their alliance networks.

#6	Maximum network advantage is realized when an organization coordinates its alliance activities internally.
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The most basic concept involves how networks provide information, cooperation, and power advantages. This is **Network Advantage Principle #1: Links among alliance partners transfer information, cooperation, and power.** This applies with work colleagues, countries, or in this case, doctors. Let's begin by looking at one of the doctors on the periphery of the network, such as Doctor #038. He has a relationship with only one other doctor who in turn also has only one other relationship.

Clearly, not everyone in the network reaps the same advantages. Poor Doctor #038 has less potential for influencing others and likely is disadvantaged when it comes to accessing information flowing across the network of doctors. This illustrates **Network Advantage Principle #2: Even though networks transfer information, power, and cooperation, these advantages are not evenly distributed within the network.** That is, some network players (individuals or firms) occupy better positions than others. And, that is why *network* advantages create *competitive* advantages. Some network positions are better than others.

We see similarities between the networks drawn in this chapter and the network of roads illustrated in the map of Roman Britannia shown in the Introduction. Just like roads help transfer people, goods, and money between cities, relationships between firms help transfer information, cooperation, and power. And so do relationships between people. Regardless of their basis—roads, alliances, or advice—relationship networks are important. They affect cities, firms, and people, and these effects occur whether the cities, firms, or people are aware of them or not.

Alliance Portfolios

Now that you're comfortable with the concept of networks and their importance, let's return to the examples of inter-firm alliances. If you're an executive in charge of relationships in your firm, how can you benefit from your network of inter-firm relationships? The most important thing to recognize is that each alliance is a part of your alliance portfolio. How big your portfolio is, who belongs to this portfolio, and how it is configured will affect whether or not you can get extract competitive advantage from your network. Let's examine what the alliance portfolio means in practice.

Business managers are very familiar with the concept of “portfolio management.” Companies manage a multitude of business units through a deep understanding of not only the competitive advantage of each individual business unit but also through a clear and focused assessment of how much additional competitive advantage the collective portfolio of business units can achieve through collaboration and sharing of resources. The same is true for networks of alliances.

An organization’s alliance portfolio is comprised of all the “thick-line” relationships that it has with its partners. A **thick-line relationship** is one that involves both partners deeply through significant information exchange and important joint activities. In general, the thick-line relationships connecting your firm and your partners are more likely to affect your company’s network advantage. You manage these relationships more closely because they involve many activities or strategic activities. The Romans paved the highways that had greater military importance or handled more commercial traffic; as a result these highways became even easier to use. Thick-line relationships between firms work the same way. It is clear that if your company formed joint ventures or strategic alliances with a particular partner, you have a thick-line connection between your firms and they are included as a part of your alliance portfolio. When drawing pictures of alliance networks, you can use thicker lines to show these thick-line relationships and use thinner or dotted lines for the less substantial relationships like subcontractor relationships.

Sometimes a firm can have a very deep relationship with a partner, such as a buyer-supplier relationship, without calling them an alliance partner. For example, Intel and Dell don’t have a global “strategic alliance” that governs all of their joint activities. However, they exchange a lot of information about product development and trends in different product or geographical markets. Intel has senior and mid-level executives whose task involves managing the relationship with Dell, and Dell also has senior and mid-level executives who manage the relationship with Intel. The two companies do joint research on trends in consumer usage of IT services.⁵ Thus, for all practical purposes, the relationship between Dell and Intel will affect the network advantage of both companies and we would call them alliance partners to be considered within each company’s alliance portfolio.

You should consider as an alliance any thick-line relationship that has significant resources and knowledge flowing through it and which is important to your company over the medium- to long-term horizon. Furthermore, if the relationship involves many joint initiatives and dedicated

⁵ http://www.arnnet.com.au/article/432198/productivity_workplace_connected_it_consumerisation_study/

people from both organizations are involved in managing the tie, then this relationship will contribute to the network advantage of your firm. Alternatively, a short-term buyer-supplier deal in which your company pays for goods or services received from another and little other information or resources flow through the relationship is probably not something you need to consider as an alliance or a source of network advantage.

Alliance Portfolio versus Ecosystems

We are also often asked about the difference between alliance portfolio and an ecosystem, which is a very popular term in modern strategic management research.⁶ The definition of an **ecosystem** is very broad: a group of organizations that have a common goal. For example, the ecosystem created by Apple includes hardware manufacturers, such as Foxconn,⁷ and the various companies that make apps for the App Store. Apple might have a very substantial relationship with Foxconn which involves sharing knowledge and information. In addition to simply buying and selling the product, they have dedicated relationship managers on both sides and the relationship is important to both partners. However, app developers, especially the small ones, don't have a substantial relationship with Apple. All they do is develop apps according to Apple's specifications and place them on the virtual shelves of the App Store. Thus, from Apple's standpoint, its tie with Foxconn is a relationship worth considering as a part of its alliance portfolio. Its relationships with the app developers, especially the smaller ones, are part of Apple's ecosystem and not part of its alliance portfolio, unless some of these app developers are so important to Apple that they form a strategic alliance or a joint venture.

Thinking in terms of alliance portfolios as opposed to ecosystems should be more liberating for you. Ecosystems are usually built around large organizations such as Microsoft, Nokia, or Apple. These are the stars at the center of a galaxy. Smaller firms "orbit" the star, in other words the center of the ecosystem. They are dependent upon the "star" firm for selling their products or services and they are also subject to the rules of the ecosystem which the "star" firm imposes. However, every firm (yours included) can become a "star" in its own right when building its own alliance portfolio. That is, your firm occupies the center of your alliance portfolio. You are the center of your own alliance

⁶ Moore, James F. (1996). *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems*. New York: Harper Business

⁷ Foxconn is a brand owned by Hon Hai Precision Industry Company. Since Hon Hai often uses Foxconn in its external communications and even as its trading name, we use it in this book.

universe. And you should decide how to structure relationships with your partners based on your own strategic considerations. Don't let others create an alliance portfolio for you. Instead, remember to use **Network Advantage Principle #3: Success comes to firms that actively manage their alliance portfolios.**

In the previous chapter, we introduced the concept of using the first, second, and third degree perspectives to think about your firm's alliance network and its network advantage. Let's return to these concepts and think about how they might have helped get the Stealth Bomber project off the ground in the 1940s.

First Degree Network Advantage

Remember that if relationships between firms and their partners could be placed under a microscope, most managers would see the smallest component, the individual partnerships—the first degree perspective. These are the individual relationships between a firm and its partners. In the 1940s, Northrop's alliance portfolio consisted of its individual relationships with Convair, Otis, General Manufacturing, and the U.S. Army Air Corps. In 1970s, its alliance portfolio was composed of relationships with GE, Vought, and Boeing. During the 1940s and the 1970s, Northrop formed each alliance with its partners to access necessary resources not available internally. In both time periods, Northrop created relationships to access complementary resources or capabilities.

In the 1940s, Jack Northrop had a design for the plane in his mind. Otis Elevators' expertise helped improve plane design and performance. GMM and Convair provided production facilities. In the 1970s, Northrop had the design; Vought Aircraft created the intermediate sections of the wings and GE produced the engine; Boeing was responsible for fuel systems, weapons delivery, and landing gear. In both cases, all of the partners truly wanted to take the project off the ground and shared the same hard-charging organizational culture of American defense contractors. So, the problem in the 1940s was not one of first degree network advantage.

Second Degree Network Advantage

Recall that the next step to understanding network advantage is to broaden the microscope's field of vision to capture an organization's whole portfolio of alliances, including alliances between partners—the second degree perspective. So, in moving from the first to second degree you simply add

the ties between partners as shown in Figures 1.1 and 1.2. That is, you look not only at the individual relationships between Northrop and its partners but also at how Northrop's partners themselves were connected. If a firm's partners are not connected, then the firm has a hub and spoke portfolio. If a firm's partners are connected, then the firm has an integrated portfolio.

The extent to which partners have alliances with one another determines the types of information, power, and cooperation flowing across the alliance portfolio. Abundant research shows that the second-degree network tells us how influence and trust flow and who is best positioned to direct that flow. The difference between Northrop's portfolios in the 1940s and the 1970s is telling. In the 1970s, there were many more ties among the main partners. Each core partner had ties to every other core partner. And this was critical to successfully turning the design into reality. In the 1970s, the flying wing bomber manufacturing process was overly complex, especially because now the developers also sought to incorporate radar avoidance. The requirements of low observability (radar avoidance) and aero efficiency meant the aircraft could have no seams and had to have precise angles to absorb and bounce radar as well as engineering tolerance tighter than those of any previous aircraft (1/10000th of an inch). With one partner designing the mid-wing section and the other designing the landing gear, for example, coordination and integration were necessary to achieve these strict engineering standards. However, these partnerships were formed among rivals who otherwise routinely competed for aviation projects. So trust and cohesiveness were not automatic to say the least. Working together was not the natural norm.

Indeed, in the late 1940s Northrop's alliance with Convair should have been a perfect match. Northrop needed to speed up production or face certain program cancellation. Convair, who initially lost the bid to Northrop, had aviation manufacturing expertise and an idle production facility that would otherwise need to be closed. Using common alliance terminology, they were complementary. However, it was not a marriage made in heaven. In fact, the project was delayed further as both sides could not negotiate an agreeable arrangement despite desperately needing the other's help. The U.S. Army Air Corps commander, the customer, served as an arbitrator and negotiated who would control manufacturing protocols and how much production would be allocated to Convair. Ultimately, the alliances did not solve all the complex production and engineering issues.

In contrast, the main partners in the 1970s were able to collectively solve many partnership tensions and innovation problems. Perhaps the greatest challenge involved selecting a computer design system. Northrop, Boeing, and Vought each had their own CAD/CAM design systems and did

not want to learn systems made by the others. Indeed, computer-aided design and manufacturing showed great promise but was relatively new and each company was learning to use its own system more effectively. Conceding to use a partner's system would put a company at a competitive disadvantage for the next project. This conflict could have slowed down the project if not completely derailed it. But the partners came to a compromise on a common design platform because they also worked together on other related components and everyone understood that each partner had to give up its demands in some areas.

In short, in the 1970s Northrop succeeded at achieving collaboration from its partners because its alliance portfolio was more integrated. Firms that have integrated alliance portfolios are connected to partners who are also connected to each other. These portfolios resemble the spider web concentration of Northrop's 1970's portfolio more than the hub & spoke shape of Northrop's 1940s portfolio. Integrated portfolios connect the firm to closely-linked others who share the same types of information and are more likely develop common norms offering deep exchanges of shared knowledge.

In integrated portfolios, alliance partners are more likely to deliver on their promises. This is because information flows more freely among interconnected partners. How one firm treats a partner is easily seen by the other partners to whom both firms are connected. If one firm shirks a partner, other partners will see that and will not collaborate with the shirking firm again. The integrated relationships among the partners building the Stealth Bomber in the 1970s facilitated difficult negotiations and enhanced abilities to integrate technologies.

Additionally, integrated portfolios are beneficial for fine-grained information exchanges because multiple partners have relationships where they share a common knowledge base. This shared expertise allows them to dive deep into solving complex problems related to executing or implementing a project. However, in an integrated portfolio, working from a common information base and common views leads to similar ways of thinking that can blind partners from outside perspectives. Because partners in an integrated portfolio tend to know what the other partners know, it's unlikely that breakthrough innovations will come from such portfolios.

The alternative source of second degree network advantage lies in a firm's alliances with disconnected partners. Being a hub in such a portfolio provides access to new information. Alliance portfolios that have a hub and spoke structure often have partners who know what the other partners

don't. Combining ideas across such partners often leads to breakthrough innovations. Northrop had such a hub and spoke portfolio in the 1940s. Since it already had an innovative blueprint for the bomber, all it needed to do was to execute on the existing ideas. It needed to build reliable manufacturing systems that would execute these ideas based on incremental improvements made by multiple partners at the same time. Unfortunately, hub and spoke portfolios are not very good at that. Northrop got it right in the 1970's by forming an integrated alliance portfolio that fostered cooperation and tacit knowledge exchange.

Third Degree Network Advantage

Recall that by broadening the microscope lens yet again executives can expand their field of vision to the network of alliances connecting all firms in their industry and beyond—the third degree perspective. This broader network determines an organization's status and reputation because others consider an organization as being important if it has alliances with other important firms.

The third degree perspective involves looking at how the partners share connections to other firms. This third degree knowledge helps companies understand where their alliance portfolio is positioned as compared to other alliance networks in the industry and beyond, as the more centrally located alliance networks can be an extra source of resources and status in the industry. If we look back at Figure 1.2, we can see that in the 1970s the major firms—Northrop, GE, Vought, and Boeing—were surrounded by smaller firms, much like Londinium was surrounded by other smaller cities. The smaller firms were the subcontractors to which the major firms outsourced a lot of activities. This did not happen in the 1940s, as the major firms at the time did all the work themselves. Northrop, GE, Vought, and Boeing were “high status” organizations and their subcontractors were “low status” organizations. The status distinction reflects the influence and leadership that a firm has in its industry.

Both high status and low status partners need each other. High status firms need other high status partners in order to enforce social order in the industry. Just like we judge a person by the company she keeps, so outsiders to an industry judge a firm by the status of its partners. The fact that Northrop was able to collaborate with major industry partners such as GE, Vought, and Boeing signaled that Northrop was also an influential player in the industry. In the 1940s, Northrop took this to the extreme and collaborated only with high status firms. However, when a firm needs to create new processes and technologies, only collaborating with high status firms is treacherous because they might not have all the information and knowledge needed to make a new process or a new technology.

For this, you need partnerships with low status firms. In fact, many innovative ideas for how to make the manufacturing more efficient came to Northrop from the low status firms.

The low status firms were attracted to companies like Northrop to increase their own visibility in the industry. Companies like Northrop were attracted to low status firms because they could outsource some lower added-value activities to them but also learn new things from them. The difference between the Northrop's alliance portfolio in the 1940s and in the 1970s could not have been more striking: early on it simply did not have any lower status partners to work with.

Why Networks Fail

We attribute the difference between the success and failure of the Stealth Bomber program to mistakes made at the second and third degree perspectives. Jack Northrop already had the design for the plane. Unlike Steve Jobs, he did not need to connect vastly different worlds. All Northrop needed to do was what aerospace companies often do when working together: combine what they know, develop trust, collectively integrate their technologies, and commercialize the plane. An integrated portfolio would have been much better for this purpose than a hub and spoke portfolio. In both the 1940s and the 1970s, Northrop had high status partners. However, its program succeeded in the 1970s by dividing the work between high and low status partners. Clearly, the difference between success and failure for major business projects has much to do with the alliance portfolios created by the companies.

Network advantage is obtained by understanding and using the first, second, and third degree perspectives (See Table 1.1).

Table 1.1 – Three Perspectives of Network Advantage

First degree	Finding complementary and compatible partners
Second degree	Building hub and spoke, integrated, or hybrid portfolios to match your firm's strategic imperatives
Third degree	Generating advantages associated with status which come to the well-informed and well-positioned firms

This leads to **Network Advantage Principle #4: It's important to recognize the different mechanisms at play in the first, second, and third degree perspectives and be able to shift across**

these perspectives in designing your alliance portfolio.

When a firm broadens its perspective to capitalize on its own position or status in the network or on the status of other firms in the network, it gains maximum network advantage. This can be summarized in **Network Advantage Principle #5: Network advantage accrues to those firms which are best positioned in the alliance network.**

Finally, consider the last principle. **Network Advantage Principle #6: Maximum network advantage is realized when an organization coordinates its alliance activities internally.** In other words, your firm needs to have systems and processes in place that allow information sharing and coordination across the individuals and business units which are responsible for managing alliances. If one business unit learns something from a partner, it needs to transfer this learning to the other business units that manage relationships with different partners. Otherwise, the information, cooperation, and power gained from the alliance network are lost and your firm is back to the first degree perspective—managing alliances as individual relationships and not as a part of its alliance portfolio.

BOX: Why Draw Network Pictures?

Why did we choose to hand draw network pictures to illustrate our points? The answer is that pictures (network pictures included) can help simplify making complex business decisions. By looking at the drawings, you could see the “big picture.” By looking at the network picture of relationships between the doctors, you could see more easily which doctor was better connected than the others. And by comparing the picture depicting Northrop’s alliance portfolios in the 1940s with the 1970s, you could better see how alliances between the firms actually mattered for the success or failure of the Stealth Bomber project.

By looking at different partners and their connections between each other, you can more easily see why you have a particular partner in your firm’s alliance portfolio. Does it matter whether one partner works with another? If you were to introduce them to each other, what kind of collaborative projects could they pursue so that your firm benefits as well? What can you learn from one partner that you could use in your relationships with another? Is your alliance portfolio structure optimal for what you are trying to achieve? Who are the partners of your partners? Are they high or low status? Can you link to a new high status partner by using a referral from your existing partner which already works with this firm? Network pictures help you raise these questions and engage in regular discussions

around these issues. Both will help your firm be more strategic in its ability to extract network advantage.

Going Forward...

In the next chapter, we provide an opportunity to practice drawing network maps and shifting your lens across the three different perspectives. This time, we are going to examine the sources of network advantage in a more contemporary competitive battle, the one that played out between the Asian giants of high technology: Sony and Samsung.

Chapter Highlights

- The Six Principles of Network Advantage are:
 1. Links among alliance partners transfer information, cooperation, and power.
 2. Even though networks transfer information, power, and cooperation, these advantages are not evenly distributed within the network.
 3. Success comes to firms that actively manage their alliance portfolios.
 4. It's important to recognize the different mechanisms at play in the first, second, and third degree perspectives and be able to shift across these perspectives in designing your alliance portfolio.
 5. Network advantage accrues to those firms which are best positioned in their alliance networks.
 6. Maximum network advantage is realized when an organization coordinates its alliance activities internally.
- First degree network advantage is driven by your ability to form relationships with complementary and compatible partners.
- Second degree advantage depends on whether your firm's partners are interconnected in your alliance portfolio. Integrated portfolios provide network advantage derived from greater trust among partners and from facilitating the sharing of tacit information to execute projects. Hub and spoke portfolios provide advantage based on access to novel information for developing breakthrough innovations.
- Third degree network advantage is driven by your firm's ability to include high status partners in its alliance portfolio. It also depends on high status firms' ability to learn from low status

firms.

FIGURE 1.1

Alliance Structure around U.S. Flying Wing Bomber Program 1941-1950

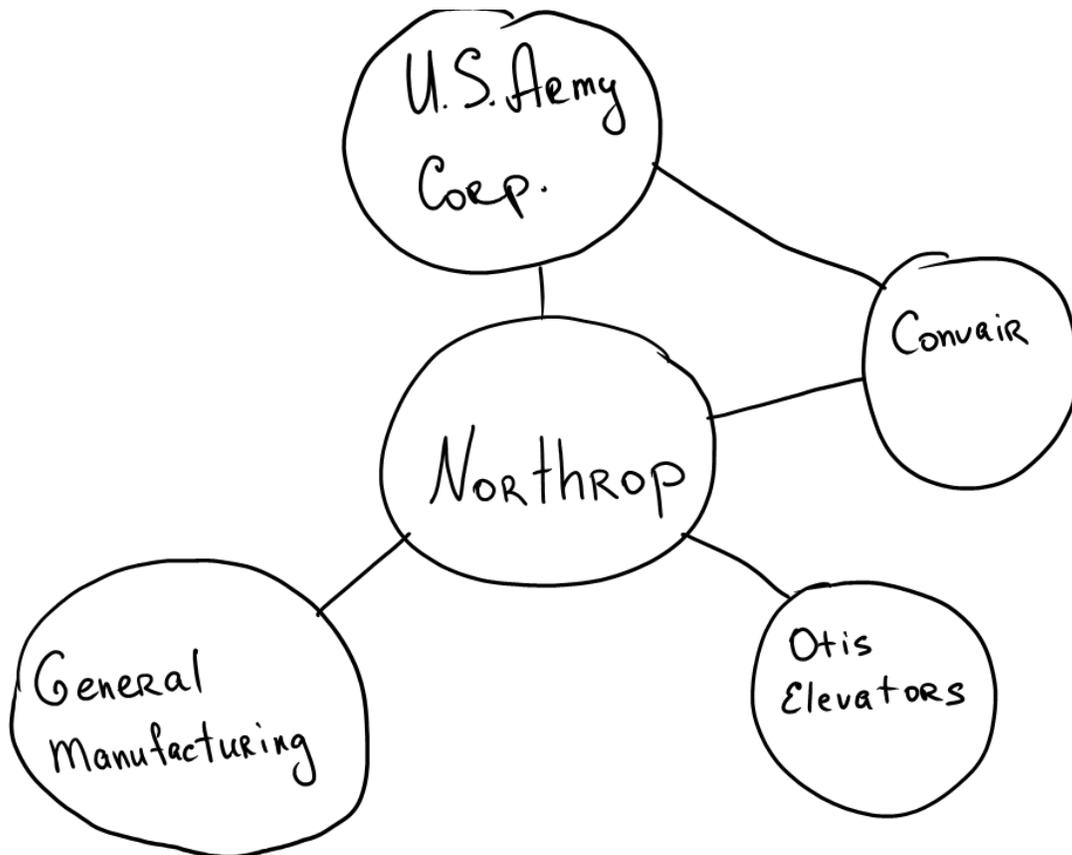


FIGURE 1.2

Alliance Structure around U.S. Flying Wing Bomber Program 1970-1989

