

GLOBALIZATION



Adaptation is essential to survival. Collaboration and networking are vital to success in today's global business environment.

by David Smith and C. A. Skelley

In the biological world, a species must evolve to adapt to the current environment in which it lives, or the species will die. This is a simple fact of the natural world, but it also applies to the business world. Industries have to adapt in order to stay competitive, and the manufacturing industry is no exception.

As the world changes, the manufacturing industry needs to change along with it. It must adjust its speed, processes, and pace of innovation and be future-focused to adapt to the new manufacturing environment. Business is increasingly becoming global and collaborative. Manufacturers must evolve into a new model of networking and collaboration on a global scale.

First, take a look at the product life cycle as well as research and product development trends in the business environment. Companies are taking much less time to develop their products because the product's shelf life is much, much shorter. Think of a computer software product. You buy Version 1.0. Before you know it, you have to upgrade to 2.5. Version 1.0 worked fine, but the upgrade, Version 2.5, has a lot of bugs. It was not as well thought out and designed as it could have been in the development stage. Why? Companies are spending less and less time developing and fine-tuning their products. Instead they are focusing on getting the products on the shelf as early as they can because the market will have better products available soon.

Innovation and development is much quicker than it once was. In another example, Apple's iPod debuted and was a hit. Very shortly after the first iPod, an even better one came with more memory and slimmer design. And another with more memory and a cooler design debuted after that. Then came phones that can play MP3 files. What is the shelf life for that original iPod? Not as long as, say, the shelf life of a CD player when it debuted on the market.

Collaboration and networking are crucial for a corporation to remain competitive. Companies have changed. Forty years ago, manufacturing companies, their suppliers, and their markets

were very regional, almost around the corner from one another. Then companies began to expand regionally and even nationally. From the 1990s to 2005, many companies became multinational—geographically speaking they are global, but they have different products and different leadership in different areas. This is changing very rapidly.

More and more corporations are becoming truly global as opposed to simply multinational—with consolidated investment, planning, and decision-making functions; trade and supply networks; and production activities and investments spread throughout the world. With a truly global corporation, no matter where you are, the product you buy is the same. Let's look at Apple again. In Hong Kong, Bangladesh, Moscow, London, or Los Angeles, the latest, slimmest, highest-memory iPod MP3 player is the same product: that is a truly global corporation.

What has guided this type of major change in business? Technology changes have been guided by a series of technology laws known as Sarnoff's Law, Metcalfe's Law, and Reed's Law. These laws have changed the ways businesses and industries operate.

Sarnoff's Law says the value of the network grows with the number of actors. This emerged from the advent of radio and television networks from the early 20th century in which a central source broadcasts to a number of receivers. The value of an advertising slot on television or radio is proportional to the number of viewers or listeners it reaches. Sarnoff's Law applies to many networks with this one-to-many behavior.

In contrast, Metcalfe's Law is good for networks allowing paired connections. First formulated by Robert Metcalfe in regard to the Ethernet, Metcalfe's Law explains many of the network effects of communication technologies and networks such as the Internet and the World Wide Web. Metcalfe's Law states that the value of a communication system grows as approxi-

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TRANSFORMATION

Sarnoff's Law
(1960–1980)
“Human Side”
Management

**Value Created by
Transforming Inputs
into Products**

- Stable Relationships
- Price Consciousness
- Producer-Led Design
- Multinationals
- Regionalism
- Productivity
- Subsidiaries
- Plant Replication by Region
- Private Lines

Metcalf's Law
(1980–2000)
Quality Management
Era

**Value Created by
Providing Solutions,
Not Services**

- Lean Manufacturing
- Shift to Horizontal Structure
- Focus on Core Competency
- Reliability and Durability
- Producer-Led Design
- Multinational Trade/Global View
- Market-Centric Design and Delivery
- Mixed Voice and Media

Reed's Law
(2000–Future)
E-Manufacturing

**Value Created by
Self-Forming Groups**

- Consumer-Centric Design and Delivery
- Flat Corporate Structures
- Collaborative Virtual Networks
- Mass Customization
- Transparency
- Speed and Agility
- Global Convergence
- IP Convergence

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mately the square of the number of users of the system (N^2): the actual calculation is $N(N - 1)$, or $N^2 - N$. Examples include telephones and e-mail: neither is of any use if you are the only one who has it, but they become a key part of your life when all or most of your contacts are connected. Interconnecting two networks creates value greatly exceeding the combined values of the original two unconnected networks.

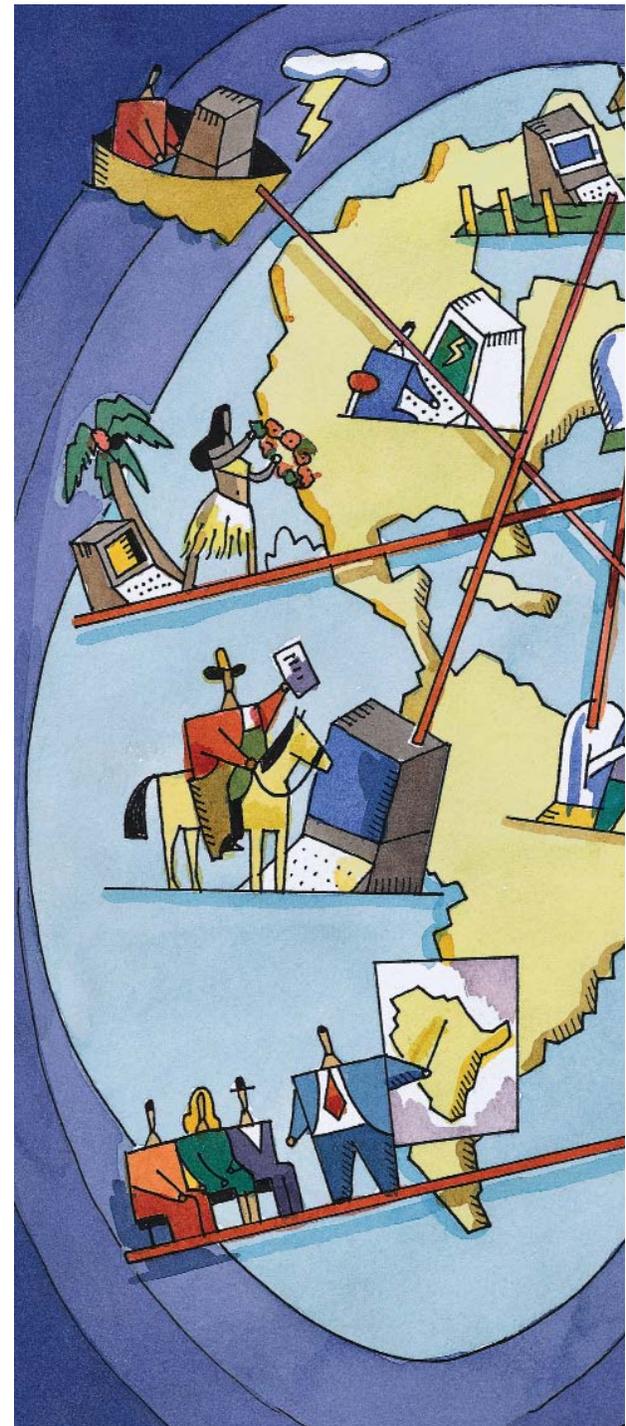
The key point about Metcalfe's Law is that because the growth in value is faster than just the increase in the number of users, simply interconnecting two independent networks creates value greatly exceeding the combined values of the original two unconnected networks. Another example is classified ads: the bigger the marketplace, the better for both buyers and sellers.

Finally, Reed's Law,¹ the assertion of David P. Reed, observes that when a network allows the users to form groups, the utility of large networks, particularly social networks, can scale exponentially with the size of the network, taking into account the many group-group connections that are now possible. In this case, combining two unconnected networks can create tremendous value.

The reason for this is that the number of possible subgroups of network participants is $2^N - N - 1$, where N is the number of participants. This grows much more rapidly than either the number of participants, N , or the number of possible pair connections (which follows Metcalfe's Law), so that even if the utility of groups available to be joined is very small on a per-group basis, eventually the network effect of potential group membership can dominate the overall economics of the system.

These groups are self-formed through communications via the Internet, electronic devices, or other innovative methods. One key point is that these communicators are not just groups of people anymore. This is the fundamental shift in manufacturing and other industries: Reed's Law and self-forming groups.

As organizations move to Reed's Law, forming and connecting groups, they develop into truly global enterprises. Whether social, academic, government, or corporate, these groups are being governed by Reed's Law. Academia is working globally in research and development as is government. Society itself is following the law. Consider Web sites like MySpace.com—perfect examples of the way our communications and networks are changing. Corporations are following, and Reed's Law drives this new approach of innovation in manufacturing. The new model connects research labs, free agents, academia, and new markets. The manufacturing



sector cannot miss out on this change if it hopes to thrive in the emerging business economy.

A good example of a global enterprise operating under Reed's Law is Boeing, which only manufactures about 8 percent of its new 787 airplanes. It has more than 300 company partners operating in 68 different countries.

Manufacturers are changing. They are no longer simply multinational companies operating autonomously in a number of countries but are truly global enterprises, networking and collaborating with a number of different groups in different locations. This is Reed's Law in action.

