A Historic Choice: Which Will It Be?

By Marshall Thurber, B.A, J.D

When was the last time you rode to work on a horse, listened to a 78 RPM record or used a typewriter? If you are a senior citizen, these events are distant memories. If you are younger, you may not have experienced them at all.

Each of the above mentioned experiences was "normal" at one time. Now they are part of our historical record. What happened, of course, is that a new disruptive technology replaced each of them. This dramatic replacement of one technology with a new breakthrough technology is called a *structural change*. When a structural change happens, individuals have no choice; to optimally operate in the modern age one has to embrace them. The individual, company or country has no vote. To operate successfully, adopting and adjusting to structural change is required.

The speed of these structural breakthroughs is based primarily on one key factor: information flow. As a general rule, the rate at which a society advances is primarily determined by its ability to *transmit* and *use* information. Former U.S. Treasury Secretary W. Michael Blumenthal summed it this way, "Information has come to be regarded as the key to modern economic activity."

Buckminster Fuller pointed out, the first co-operate tool of humanity was the spoken word. Experiences and discoveries could be shared and this body of shared experience allowed life to become easier.

Still, information that is passed verbally is often passed inaccurately. Remember the old whispering game: Put six or seven people in a line and give the first person a note. That person whispers what the note says in the ear of the next person; that person recalls what they just heard and passes that on to the next. The process continues the same way until it reaches the last person in line. What the last person receives is usually much different than the original message.

Then, approximately six hundred years ago, Gutenberg's invention of the printing press with moveable type dramatically increased the speed, accuracy, width and depth of information transfer. This key structural change helped bring standardization, then mass production and then the Industrial Revolution.

The structural changes brought by the automobile are relatively easy to observe. The interstate highway system was created, suburbs emerged, drive-in services became

common, etc. While these changes were relatively fast, humans had sufficient time to perceive, communicate and adjust to these changes.

Enter now the computer, another structural change. The computer not only increased both speed and accuracy, it also expanded both the width and depth of information; again humanity's capacity to learn and innovate took a huge leap. For example, in the seventeenth century it took Johannes Kepler four years to calculate the orbit of Mars; today an ordinary computer can do it in seconds. This structural change also added an additional element: Armed with a computer, a human could now *direct* information through complex communication networks.

While the computer was a huge structural change, another even bigger (perhaps the biggest so far) structural change emerged: the Internet. The changes brought by the marriage of the computer and the Internet is at least an order of magnitude faster than the changes wrought by the transition from the horse to the automobile.

Why is the Internet an even bigger change? Because the Internet *connects* information. Like an ice cube in hot water, what is connected and what isn't, is rapidly disappearing. This almost seamless connectivity is bringing unbelievable change.

Consider the following:

1. One out of every eight couples married in the U.S. last year met online.

2. There are over 106 million registered users of MySpace as of September 2006. If

MySpace were a country, it would be the 11th-largest in the world (between Japan and Mexico).

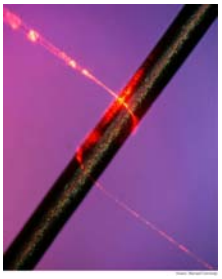
3. The average MySpace page is visited 30 times a day.

4. There are over 2.7 billion searches performed on Google each month.

5. The number of text messages sent and received every day exceeds the population of the planet.

6. Through the Internet, it's estimated that worldwide 1.5 exabytes (that's 1.5 x 1018) of unique new information is being generated this year. That's more information than has been generated in the previous 5,000 years!

7. Third generation fiber optics can push 10 trillion bits per second down *one* strand of fiber (separately tested by NEC and Alcatel). That's 1,900 CDs or 150 million simultaneous phone calls *every second*. The capacity is currently tripling about every six months and is expected to continue at least at this rate for the next twenty years. The fiber is already in place with switches on the ends the only constraint. What does this mean: the marginal cost of these improvements is effectively $0.



8. Forty seven million (47,000,000) laptops were shipped worldwide last year.

Joining the computer and the Internet (collectively called ComNet which includes all ancillary communication devices including cell phones, PDA's, text messages, Internet, computers and global media) is like combining nitrogen and glycerin. The speed, accuracy, width and depth of information have created an explosion.

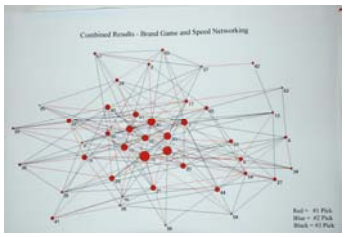
This blast has created a world (and nations) of whiskerless cats. Something big just hit them; they have lost their whiskers (and thus their bearings) and are stumbling. Relying on old theories and habits is no longer working.

Why has the ComNet created this disorientation? The disorientation is because ComNet *exponentially* increased the *speed* of information transfer.

To better understand the implications of the exponential growth of both the *amount* and *speed* of information, a basic knowledge of Network Science is key.

Network Science

The first scientific study of networks was based around infectious diseases. Starting in 1927 A.G. McKendrick and William Kermack published a series of papers that introduced the **S**usceptible—*I*nfectious—**R**emoved (**SIR**) model of networks. This is still the basic framework around which most infectious disease models are constructed. It still forms much of the theoretical basis for predicting network growth.



The letters in the acronym represent the three primary states that any member of a population can occupy with respect to a disease:

1. A **S**usceptible individual is vulnerable to infection but has not yet been infected.
2. An **I**nfectious individual not only is infected but also can infect others.
3. A **R**emoved individual has recovered or has otherwise ceased to pose any further threat (possibly by dying or isolation).

The infection can only come when the infectious individual (often called the infective) makes contact with a susceptible individual. The probability of the susceptible becoming infected depends upon a) the infectiousness of the disease and b) the susceptibility of the individual (obviously, some people are clearly more susceptible than others).

According to this SIR theory an epidemic follows a predicable course known to mathematicians as *logistic growth*. Like any human network, it grows one person at a time. The spread requires the participation of both an infected and a susceptible individual. Hence, the rate at which new infections can be generated depends upon the size of both populations.

When in its early stages, the infected population is small and therefore so is the growth rate of new infections. This slow-grow phase is the most effective state in which to prevent an epidemic. Unfortunately most epidemics are past this stage before they

become obvious; the awareness phase usually happens when the epidemic has entered the *explosive phase* of logistic growth.

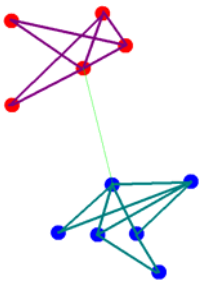
Epidemics in the midst of explosive growth are essentially very difficult to stop. Ask the British farmers who witnessed the 2001 foot-and-mouth disease epidemic. It raged for half a year throughout England and parts of Scotland. When the epidemic was detected in mid-February, only three weeks after the first cases had occurred, forty-three farms had been infected. Significantly, not one of the forty-three farms with infected animals was on a neighboring farm.

Eight months later the forty three had grown to over 9,000 farms. This happened despite the preventive slaughter of nearly four million sheep and cattle during that period.

This is not how traditional two dimensional (geographic) epidemics spread. For example, the Black Death, like a ripple in a pond, swept across Europe in the fourteenth century. It wiped out about one-fourth of the entire population; this was a traditional two dimensional creeping epidemic. It started in a single town in southern Italy and then predictably spread. The black plague took three years (1347—1350) compared to the eight months of the 2001 British foot-and-mouth epidemic.

Foot-and-mouth disease spreads between animals either through direct contact or indirectly via wind-blown droplets excreted from symptomatic animals and in virus-laden soil. Therefore, one might expect that any initial outbreak would spread along the two-dimensional geography of the English countryside. Why then was there such a rapid spread despite Herculean efforts to reduce the infected and susceptible pools? Killing millions of sheep and cattle in eight months couldn't stop it!

The answer is found in technology and network science. The combination of modern transportation, modern livestock markets (where animals from geographically dispersed farms are exchanged) and hikers carrying infected soil on their boots created a series of events that moved the infections almost everywhere over night. In network terms the events are called *"weak ties"*.



It is this weak tie that rapidly infects whole new clusters by a single connection. Network scientists call this phenomenon, "The strength of the weak tie." A weak ties act like a shortcut; it, in effect, makes the disease seem to jump from one cluster to another. (For a more detailed analysis of this weak-tie phenomenon please email me at metamarsh@aaol.com for a fuller explanation.)

The Significance of the *Strength of the Weak Tie*

ComNet has created a series of weak ties that can cross the globe almost instantly. Using computers, the Internet, and the range of ancillary communication devices people are now connected and getting more so every second. The more connected, the faster information is transmitted. As mentioned earlier, the number of text messages sent and received each day already exceeds the population on the planet. Information is already traveling at speeds very difficult to comprehend. The speed, width and depth of ComNet's information explosion is causing many humans and nations to act like whiskerless cats.

9/11 and the Terrorist Disease

How can Terrorism be stopped? Can the SIR model provide some insights? There are clear parallels between how terrorism and infectious diseases spread. Clearly, both have **S**usceptible pools, with some in each more susceptible than others; a terrorist who is beyond persuasion can be viewed as **I**nfected and those imprisoned or killed are **R**emoved.

The SIR model is a frame to create strategies to reduce both the Susceptible and Infected pools. Each requires very different distinct strategies.

Much has been written about how to reduce this susceptible pool. It starts with understanding that the primary problem is not Islam, it is something deeper; it's about human social networks and how humans operate.

American political scientist Roger D. Peterson stated, "People don't get pushed into rebellion by their ideology. They get pulled in by their social networks." Australian Army Captain David Kilcullen, who wrote his doctorate dissertation on the Darul Islam conflict at the University of New South Wales in 2001, states, "Although radical ideas prepare the way for disaffected young men to become violent jihadists, the reasons they convert are more mundane and familiar: family, friends, associates."

Each susceptible pool is unique and relatively small. It has its own economy, history, religion, culture and grievances. Learning these differences and then designing customized methods of meaningful support is a start. Over time, trust and appreciation can be built and, as a result, the Susceptible pool should shrink.

On the other hand, a terrorist by definition is beyond persuasion; they are already infected. Intelligence and force are the key strategies to remove them.

"shock-and-awe" Effect

The methods Secretary of Defense Donald Rumsfeld's *semi-discriminate* "shock-and-awe" approach in Iraq relied on technology, long range firepower and spectacular displays of force. Looking at this from a SIR frame, this "shock-and-awe" strategy had at least one major undesirable effect: It injured or killed innocent family, friends and associates (or collateral damage as is often called). The more collateral damage created, the larger both the Susceptible and Infected pools. As these pools grew the number of terrorist (the **I**nfectives) dramatically increased.

The Army and Marine Corps counterinsurgency field manual has just been rewritten (the one before this was written during the Vietnam War). The phrase "think globally, act locally" is the underlying tenant of this manual. Viewing the manual from a SIR perspective, it appears that U.S. counterinsurgency methods of reconstruction and stabilization are focusing on the Susceptible pool.

These counterinsurgency tactics of reconstruction and stabilization effectively converts

Rumsfelt's quick "shock-and-awe" war into something entirely different: "the long war on terror." Time, patience and U.S staying power are the key ingredients for this counterinsurgency strategy to succeed. Presently these ingredients don't seem politically aligned with the American voters.

Information as a Weapon

Back to Australian anthropologist and lieutenant colonel David Kilcullen (who is now "on loan" to the U.S. government): While working for the Australian government just before the 2004 elections, he noticed in Osama bin Laden's public statements a list of grievances against America. This is the list: Palestine, Saudi Arabia, Afghanistan, and global warming. It instantly struck Killcullen that "this wasn't a list of genuine grievances. This was an Al Qaeda *information* strategy!"

Looking at Al Qaeda from this context changes almost everything. Since 9/11 Al Qaeda's primary focus is to use information to generate the perception of an unstoppable, growing insurgency. Terrorists have become expert at using *technology* to generate this perception.

The January 15 Newsweek article points out,

"Most of the large-scale attacks on U.S. Forces are now filmed, often from multiple camera angles, and with high-resolution cameras. The footage is slickly edited into dramatic narratives:

quick-cut images of Humvees exploding or U.S. soldiers being felled by snipers are set to inspiring religious soundtracks or chanting, which lends them a triumphal feel. In some cases, U.S. officials believe, insurgents attack American forces primarily to generate fresh footage."

Traditionally, information warfare favored the wealthy; this is no longer the case. Today accessibility of ComNet tools is equal. Production work that once required a studio can now be done on a laptop. CD's of attacks on the U.S now sell for as little as fifty cents; cell-phone technology (like the filming of Hussein's hanging that took up just over one megabyte) is especially easy to disseminate.

The CD's are available within hours after the attack. Andrew Garfield, a British counterinsurgency expert states, "You can really say the propaganda is only a cell-phone call away."

The Zawra channel, run by a former Sunni parliamentarian, broadcasts an almost unending supply of clips of American soldiers being killed in sniper and IED (Improvised Explosive Devices) attacks. These clips (often in English) admonish Iraqis to "focus your utmost rage against the occupation."

According to the same Newsweek article, "The U.S. military's response…usually sticks to traditional channels like press releases. These can take hours to prepare and are often outdated by the time they are issued."

The insurgency has embraced the most advanced technology and the U.S. has not. Granted the CompNet (with the Internet and cell phone leading the way) is better suited to small, nimble organizations. However, this reasonableness is like saying "No thanks, it's too difficult for a big organization to learn how to drive cars, we should continue to ride horses."

A Global War on Terror?

Calling the Terrorist behavior a "GlobalTerrorism" gives it great significance. It makes Terrorist initiatives seem monolithic. Networks are not monolithic they are a series of much smaller clusters joined by weak ties.

Counterintersurgency can weaken the perception of the Terrorist strength by disaggregating the "War on Terror." Communicate globally that the terrorism is not one monolithic enemy; that each terrorist cluster has its own economy, history, religion, culture and grievances.

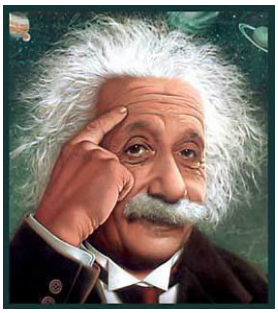
Is Force Effective in a Connected Age?

Force hasn't worked well in either Iraq or Lebanon. Hezbollah's success in South Lebanon and the U.S. whiskerless cat behavior in Iraq are the evidence. The *Networked Age* and its ramifications, like many structural changes, have taken both the U.S. and Israel by surprise. The Iraq and Lebanon war results are a wake-up call to these force-led

strategies. The new reality is: in the *Networked Age* force can't permanently succeed against ComNet resistance.

Networks are only going to get stronger and, as they do, the long term success of force becomes weaker. The Networked Age, like all structural changes, must be embraced. The stakes are extremely high. Failure to embrace this structural change is probably an endgame strategy.

The Way Forward



The concept of the Long War has to be recontextualized; it must morph into an *Earthian Success Strategy* (ESS). We are all interrelated earthians on one dirt-ball planet called spaceship earth. Technology seems to have brought us to this choice: global cooperation or global destructive ComNet war. The first steps are 1) mutual global support, 2) the recognition of the benefits of diversity, 3) communication with integrity ComNet style.

As Einstein said, "Altering your doctrines when the facts change is not a sign of weakness; it is essential to strength."