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Paul Licker
Oakland University, Licker@oakland.edu

S Cameron Circhton

THE TWO CULTURES AND THE INTERNET REVOLUTION

Abstract

This document reinterprets C. P. Snow's famous "Two Cultures" (the so-called "literary elite" and scientists) lecture of 1959, in light of advances in information systems in the past fifty years. While Snow referred to specific groups, his analysis is generalizable: cultural groups differentiate through lack of communication. Here Snow's analysis and advice are applied to a different pair of "cultures"(IT purveyors and IT users) as an example of his general principles. At a time of great unease about terrorism in the face of apparently relentless technological advance – analogous to Snow's speech at the height of the Cold War—and also during a time of (then) apparently dramatic technological advance, the lessons Snow derived can now apply usefully to today's specific "two cultures" case.

1 MID-CENTURY ANGST

The year 2009 is the 50th anniversary of Sir Charles Percy Snow's now-classic "Two Cultures" Rede Lecture at Cambridge University (Snow, 1959, 1971). This lecture seemed, at the time, to be a polemic intended to inflame and annoy and yet is now clearly typical of the mid-20th-century essay attempting to find order in the chaos created by conflicts between science and the arts (Boytinck, 1980; Davis, 1965; Glass, 1959; Halperin, 1983). This current 2009 essay seeks to find lessons in Snow's lecture for practitioners of the "science" of information systems; position IS intellectually on a far broader canvas than is usual, and contribute to critical thought concerning what IS is really about. Using Snow as a springboard for insight, we come to the conclusion that users can and should play a bigger, more pivotal role in determining use and ultimately the value of information systems.

Here is the plan of the paper: to recast Snow's "two-culture" hypothesis as a general principle by revisiting his original speech and then to apply that general principle to the current interaction of another "two cultures": purveyors (ITP: developers, marketers, and researchers of information technology) and users (ITU: those who employ IT for business and daily life). It will focus on the following questions:

- What is the essential argument that Snow made about the "split into two polar groups," in his words, of Western society, independent of the specific groups he identified?
- Which of Snow's statements concerning the "gap" he pronounced as existing between the two cultures he cited in 1959 are true of today's ITP and ITU"cultures" ?
- Are the causes of today's cultural gaps identical, similar, or analogous to those Snow decried in 1959? Are they in any sense predictable and/or controllable?
- Are the lessons Snow derived in 1959 applicable today to the "user-IT" gap?

There is a caveat. When Snow spoke about the "scientific revolution" in his speech, he certainly did not meant the Copernican revolution, the rise of the scientific method and the development of scientific thinking. It is the Industrial Revolution to which he is really referring. He said in his lecture that the Scientific Revolution "comes from the application of real science to industry, no longer hit and miss, no longer the ideas of odd 'inventors', but the real stuff." Similarly, when we refer here to the "Internet Revolution" we are not necessarily referring to the immense change in focus that the Internet is bringing about, including virtual communities, globalization, and vastly distributed computing. Instead, we are thinking about the application of these ideas to everyday life. To rephrase Snow's words for today: "*The Internet Revolution comes from the application of real global, networked information to industry, no longer hit and miss, no longer the ideas of isolated 'technologists', but the real stuff.*"

The middle of the twentieth century was a time of great re-thinking. Not only had a great war devastated much of the heart of modern civilization (east and west), but atomic threats to the survival of the human race were made palpable to the public through modern realistic media such as television. Most of what passed for history during the second half of the twentieth century was a working out of the great clashes of the first half: the end of empires and colonialization, the modernization of societies, the shifting of labor from the farm to the factory and the office, the movement of people from the countryside to cities, an explosion in literacy and democracy. In every sense, the 1950s were a time of thinking about and exploring the implications of the great dichotomies of the previous half century: freedom vs. totalitarianism, ignorance vs. knowledge, privilege vs. participation, fear vs. security, workers vs. the establishment, gender roles, and so on.

In this intellectual environment in 1959, the British novelist-scientist-politician Charles Percy Snow, not

yet Baron Snow of Leicester, delivered the annual Rede Lecture at Cambridge University. The series provides a forum for noted individuals to discuss the issues of the day. For Snow, delivering the Rede lecture was not only a personal triumph for the scientist-turned-author-turned-bureaucrat, but also a chance to deliver a personal statement very much in tune with the mid-century spirit of the times.

Snow's career embodied many of the dichotomies that were the subtext for the mid-century angst expressed on both sides of the Atlantic and elsewhere. In addition, he brought together the disparate intellectual threads found in the range of speakers in the Rede Lectures. The son of a working-class Leicester family, he became a life peer; an outsider in an "old-school" British Establishment society. He created a new kind of literature documenting his own kind – the scientist-bureaucrat. He was appointed to position of parliamentary secretary to the first Minister of Technology in 1964 and served in this position two years (the ministry survived on its own only four more years, until 1970).

Snow was thus in a unique position to see all sides of technological progress, or lack thereof, from both the scientific as well as the high-level government viewpoint. Sir Charles delivered a lecture that was a synthesis of a number of discourses on the topic of "gaps" or "divides" and how to bridge them or narrow them. True to the mid-century ethos, he dwelt on these, among others, distinctions: the West vs. the East, science vs. the arts, pure science vs. applied science, literary intellectuals vs. scientific intellectuals, the wealthy countries vs. the poor countries, industry vs. art, the political left vs. the political right, among others.

Snow's conviction in 1959, in the face of real danger of all-out nuclear warfare directed by governments that didn't really understand the science, was that one very useful way to defuse the situation was through technology transfer. Not, of course, *nuclear* technology transfer, but scientific knowledge transfer. The mid-century *nuclear* angst passed with the fall of the Berlin Wall. It is questionable whether an analogous information wall's falling (i.e., the advent of the Internet) relieves the early 21st-century information angst.

Snow made three major points in his lecture, one empirical and subject to test, one controversial and highly personal, and one universal and largely ignored. The empirical statement concerned what he termed *"the two cultures"*, namely that scientists and the "literary intellectuals" (i. e., British writers, critics and university professors) operated in completely separate, mutually non-communicating cultures (one major problem with Snow's lecture is that he provided no consistent, acceptable, reliable definition of "culture"), each with its own language, rites, rituals, and values. This point was uncontroversial in its essence and not novel (for example, Matthew Arnold delivered a Rede lecture on the same topic in the 1880s). However, after the lecture, this point was misunderstood by many and used as a smokescreen for those wanting to avoid discussing the second, more controversial, point.

This second point was that the culture gap was a threat to civilization and that *it was the job of education to repair this*. The point became controversial because he chose to criticize the very social system that enabled the rise of Baron Snow by implicitly derided a seven-hundred-year-old educational system. Less controversial in America, Snow's second point was welcomed with open arms by educationalists eager to reform a system always ready for reform. But in Britain, the debate focused instead on Snow's literary "credentials" as a member of the literary intelligentsia (Leavis, 1963).

Point number three was that the cultural and educational gaps aid and abet *a third gap, that between the rich and the poor worldwide*, and that this gap would respond positively to technological knowledge transfer. Of course Snow didn't invent this idea; the World Bank came into existence in 1944 for reconstruction of war-torn Europe. Snow's idea, of a kind of technological Peace Corps (to use an American term from the 1960s), was well intentioned and useful, but generally ignored. It's an idea that

needs to be reexamined.

In summary, Snow could point out in 1959 that the world was dangerously divided in multiple ways around the role of science amidst the threat of atomic annihilation, driven by economic inequalities. In 2009 the same is still true, but the pivot is information. If Snow's thoughts could be brought up to date and put into information terms, what advice would he give now analogous to what he suggested in 1959? Each of the ideas in his speech is worthy of revisiting, but it is to his first two that we turn here, mapping his thoughts from "science" to "information." Sections two through four of this essay refer to his first idea, that of the "two cultures" gap and its implications. Sections five and six address ways of reducing this gap.

A note is in order on the use of the term "culture." Snow did not give it much thought in 1959. At times he seemed to be referring to "high" culture (i.e., literature and the fine arts) and at other times merely to group membership. As we will see later, "shared values" may serve better as a distinguishing characteristic, although Snow did not dwell on this concept in the Rede lecture, but of course a great deal of thinking has been directed towards this term in the past 50 years. Leidner and Kayworth (2006) have provided the seminal work here. They chose to conceptualize this troublesome idea of "culture" as "shared values". They would fit Snow's thoughts -- and our recasting of them in modern terms -- into their theory of IT-culture conflict as *contribution conflict arising from mismatches between user group values and IT values.* While this does not completely capture the very broad and inexact application of the term "culture" that Snow intended, it is useful for our discussion below.

2 TWO POLAR GROUPS

The Rede Lecture gave rise to the "Two Cultures Hypothesis." The largest part of the speech presented evidence for a gap between two important groups in mid-century British intellectual life: scientists and the "literary elite." Little of his speech was true science subject to hypothesis testing. To refer to his idea as a hypothesis stretches the metaphor. Nonetheless, let us assume that the gist of what he was referring to was true in 1959. What is the essential argument that Snow made about the "split into two polar groups," in his words, of Western society?

C. P. Snow referred specifically to "literary elite" (sometimes he refers to them as "literary intellectuals" and other times merely as "intellectuals") and "scientists." It is clear that the literary intellectuals he referred to were writers, essayists, Oxbridge dons, and to some extent the journalists who make the intellectual basis available. By extension, he was referring to the British political and social elite with this term. Initially – and increasingly – Snow's "literary intellectuals" became identified with "the arts" and numerous essays appeared to debate the "science vs. the arts controversy" (Boytinck, 1980).

By "scientist", Snow meant practicing bench scientists, individuals who derive and test scientific hypotheses. Snow was not comfortable with including technologists and engineers in this group and it is doubtful that he would have had as much to say about applied scientists, social scientists, and computer scientists, either. On occasion he does put engineers and scientists together, but generally he makes a strong distinction between pure scientists and those who are applying scientific principles.

Why were and are these two groups important? One might, with the comfortable space of fifty intervening years, conclude that Snow's polemic was personal. Perhaps the only real reason he felt the need to draw attention to the gap between these two groups was that as a novelist and a physicist Snow felt drawn to both camps. But if we follow O'Hear's (n.d.) argument, these are two *essential* groups in a society such as ours as they represent ways of apprehending the world through either a value-tinged lens or a value-free

lens. O'Hear said

> To put all this another way, science aims at an observer-independent account of the world, transcending human meaning, culture and ideology. Its success derives from its success in approximating to this aim, for it is in so far as we go beyond looking at the natural world in terms of its first meanings for us that we are able to penetrate further its causally essential core, and so become rather more adept at manipulating and directing it than those who remain at the level of first impassions. The lesson of post-Galilean science is that there is no reason to suppose that the effects and processes we identify in our first transactions with nature will turn out to be those which are fundamental from a causal point of view.

Hence, by working in complementary ways, science and the arts put the value basis of our living in stark relief. By transcending "human meaning", science, in O'Hear's words, shows us where values are active. Without science, everything is "impassioned". Since we cannot reliably describe, define, and delimit the passions and come to understand everything, the literary elite need science.

Similarly, science also needs the literary elite. O'Hear says that "…an exclusive concentration on scientific modes of thought can affect the way in which judgments of value are made. In particular, it can lead to an importation of quantitative considerations, and a tendency to see social and moral problems in terms of hygiene and environmental manipulation." There are two complementary ways of apprehending reality. This complementarity is a characteristic, too, of the ITU/ITP "gap".

3 TODAY'S "TWO CULTURES" AND TODAY'S "GAPS"

Let us now shift the emphasis and focus from "Would Snow be right today?" to "Is there something happening today that is *like* what Snow was describing both in extent as well as impact? ITP and ITU communities share characteristics that separated Snow's original "two cultures." ITP and ITU speak different languages, have experienced different education; have paths that, if they ever intersect, cross only at a desktop computer; and generally appear ignorant of each other's ideas and values.

The "gap" between these two groups is legendary. For much of the past fifty years, there has been a monumental struggle within business organizations concerning information tools and their purveyors. Beginning in the 1960s with the concept of "resistance" and moving through the "end user revolution" and "IT/business alignment" to today's thoughts about "IT governance", the struggle over who gets to control IT investment and deployment has endured through multiple generations of software, hardware and Microsoft products. It does not seem to go away, whatever the current manifestation of the presenting problem. The underlying "cultural" gap may be the ultimate cause. Complaints of "The system doesn't work!" "The help desk is unresponsive", "The IT guys are arrogant and speak in computerese", and "IT is too expensive" come from the ITU side. "IT doesn't sit at the 'table'", "We are seen as plumbers, not as contributors to strategy", "I can't get my budgets approved" and "It's impossible to keep talented staff in this environment" come from the ITP side. This certainly indicates a gap. Is it the kind of gap that Snow referred to in 1959? Is it as important? Is the "ITP/ITU gap" the "two cultures gap" of 2009?

One way to approach this question is to think about which of Snow's statements concerning the science/arts "gap" in 1959 are true today of ITP and ITU. Are ITU and ITP "cultures" in Snow's sense? Do they have the kind of alienation Snow alluded to in 1959? Are the predictions the same? How can Snow's hypotheses be understood in terms of today's society and its information issues?

Clearly there are important differences. Science is a system of procedures and philosophies with a long

history and the goal of understanding the physical universe. The liberal arts represent the accumulated total of human experience and thought on moral issues. On the other hand, the activities and the body of thought of ITP go back at most about sixty years. This body of thought is generally limited to two major areas: business (or, more broadly, administration) and engineering (including software engineering and computer science). The comparison might seem stretched and nebulous. Unlike science, there is no real canon of IT practice; no ethical history; no historical struggle against, say, established teachings; and no systematic methodology comparable to the scientific method. Unlike the practitioners of the liberal arts, the users of IT (ITU) are not a group of intellectuals focusing on the fiber and core of civilization; they aren't homogeneous and dedicated to increasing our understanding of issues unrelated to profit or proper administration; they don't wield "power" in any arena and are, in many cases, totally powerless, at least to get their IT "working properly."

Yet these differences do not dispel the comparison. Because IT is now critical to the survival of culture (which has come to depend on digital information and the World Wide Web to keep commerce and culture alive) and because IT users are in fact the drivers of that culture, Snow's comparisons are particularly apt. Here are some from the original lecture, slightly modified to reflect the new groups:

> [T]he intellectual life of the whole of western society is increasingly being split into two polar groups. When I say the intellectual life, I mean to include also a large part of our practical life…. Two polar groups: at one pole we have the *[information users]*…. at the other *[information purveyors]*…. Their attitudes are so different that, even on the level of emotion, they can't find much common ground. On each side … some of [this prejudice] which is not entirely baseless. It is all destructive. Much of it rests on misinterpretations which are dangerous. [Emphasis mine]

What about the relationship between these two "cultures"? Surely IT users *use* IT in ways that the "intellectual elite" never "used" science in 1959? IT users *depend* on IT more directly and intensely than the intellectual elite of 1959 depended on science. Innovative IT users sometimes develop their own systems and applications using common packages such as spreadsheets or databases. And it is unlikely that the intellectual elite of 1959 developed scientific hypotheses which they then tested in experiments. Is this comparison strained, then?

Yes and no. The alienation Snow spoke of was related mostly to a lack of communication, the lack of a common language, differences in values, and a large "gap" in terms of attitudes and values. In Snow's own words:

> The two cultures were already dangerously separate sixty years ago….Thirty years ago the cultures had long ceased to speak to each other: but at least they managed a kind of frozen smile across the gulf. Now the politeness has gone.... It may well be that this process has gone too far to be reversible.... Closing the gap between our cultures is a necessity in the most abstract intellectual sense, as well as in the most practical. When those two senses have grown apart, then no society is going to be able to think with wisdom.

Today, this alienation takes on a more modern appearance if we stop thinking about science as an esoteric practice completely out of reach of the literary elite and instead view it more as a different way of understanding the world. Of course "the world" in Snow's terms was restricted to the physical universe – and he focused strongly on physics as the exemplar of science. A C. P. Snow of 2009 would have to recognize social science and administrative science as legitimate scientific ventures, whose purpose is to understand in a systematic way a limited set of phenomena, some of which take place in the physical

universe, some of which take place within derived social – but still physical – domains and some of which involve virtual domains such as money and influence. Yet, within these domains, the goal is still understanding. But the goal of the literary elite is also understanding -- understanding the human heart, in its broadest (and least medical) sense: human endeavor, aspiration, love, morality, history and conflict. It was just a different way of understanding from that of science. In both cases, there is an "out there" that needs to be understood by people "in here." Science and the arts are separated most fundamentally by their ways of apprehending the world. That this understanding is *supposed* to be objective for science and *can be* comfortably subjective for the arts is important for judging the aptness of our comparison of ITP and ITU as cultures.

What separates IT purveyors and IT users to generate a gap comparable to that between science and the arts? The answer must be that information is the "object" of the purveyors and the "subject" of the users. The purveyors value information as an object, one that must be handled systematically, carefully, and with great respect for its beauty and brittleness. Most IT users – especially business users -- value information because of what they do with it. The information describes the subject of their work lives so information is respected respect for what it means, not what it is. Information is, ironically, a work of art to the purveyors, and a means to an end to the users. Information *represents* power, confidence, and influence to the users. Information *is* none of this to the purveyors; it represents nothing, but is itself, the thing. And this difference is precisely the same as that dividing science and the arts.

Are the two ITgroups "cultures" in the same sense in which Snow applied the term? Snow was not an anthropologist but he was using the term "culture" in its usual (dictionary) sense: a particular group of people and their ideas, which are passed along or transferred to successive generations. Both scientists and literary intellectuals do indeed have sets of ideas that they pass along, through education and the media to which they contribute and subscribe, to successive "generations". Within their own ambits, both science as well as the literary and intellectual arts do ascribe ownership to sets of ideas (sometimes referred to as "schools"), provide titles, and enforce customs and regulations. It was this restricted sense of "culture" that made it easy for Snow to identify these two "cultures" and their alienation, since they did not share "a language" between them, but only shared a language within a group. He said, "[A]fter a few thousand Atlantic miles, one found Greenwich Village talking precisely the same language as Chelsea, and both having about as much communication with M.I.T. as though the scientists spoke nothing but Tibetan." Thus knowledge and language served to divide cultures in Snow's mind, although he also referred to shared values (scientists were, to Snow, what we would refer to today as "liberals"; the literary elite, "conservatives") but treated differing values more as the result of differing cultures than the cause, unlike Leidner and Kayworth (2006).

In the way Snow used the term "culture", it is difficult to label ITU a homogeneous "culture". But clearly "users", despite the enormous difference in their jobs, goals, and work processes, share similar attitudes and values, at least with respect to information. Perhaps this sharing stems from a common feeling of helplessness at the end of the phone line to the help desk. Or maybe these attitudes stem from accumulated negative emotions through years of experiencing unresponsiveness or even arrogance of the ITP. Regardless of the source, evidence of the cultural "values" of the ITU are mostly evidenced by resistance, coping strategies, and work-around activities (Jasperson, Carter and Zmud, 2005; Lapointe and Rivard, 2005; Beaudry and Pinsonneault, 2005). In general, their experiences are at best neutral. And these experiences and values are definitely "passed along" through on-the-job training, office "lore" and gossip. This is alluded to by Leidner and Kayworth (2006) in their listing of "IT values". Their contention is that a mismatch between IT values and "group member values" (i.e., user values) results in "contribution conflict" a mutual misunderstanding of what IT is "about."

ITP "culture" is easier to describe. Because IT education is generally highly circumscribed, the IT world view is relatively homogeneous, centered on the technology itself and the supporting platforms such as application environments, operating systems, physical equipment, protocols, etc. The ITP view of ITU is that ITU users are the uncontrollable variable at the other side of the "interface". This is not to deny that there are sub disciplines in the ITP universe that focus on users. We have multiple theories of technology adoption, end-user system involvement, and human-computer interaction. The field of "management information systems" promotes the idea that information systems are essential in business and work towards bridging the IT-user "gap". Yet there are few useful theories of the role of the user in system use. The literature of user involvement generally focuses on users as objects of study (during the early stages of system development) or as difficult-to-handle interfacing systems (looking at the diffusion or adoption of innovation and the "resistance" literature). There is almost no post-implementation literature looking at user innovation, user stewardship or ownership, or user responsibility. Just as scientists do not really worry daily about whether non-scientists will actually apply the principles upon which gunpowder functions as an explosive to build and operate lethal weapons, so, too, are members of the ITP largely unconcerned about what users actually *do* with information systems. The values of the ITP rarely extend to any aspect of the deployment of systems. And these values and experiences are also passed "along" through on-the-job training, office "lore" and gossip.

4 THE CAUSES OF THE "GAPS"

If we have two IT cultures with a relationship strongly analogous to those Snow described, can we also ascribe this relationship to causes similar to those Snow referred to? Snow strongly implicated specialized education as the major reason for the gap between his two 1959 "cultures". ITU and ITP also have *differing educations*. Just how different are these educations? And is it the education that is the cause, or is it the effect? In 1959, Snow referred extensively to an educational difference as "specialization". British university education in the 1950s was highly specialized. Even today, students enter these universities directly into narrow specializations in science, literature, and other fields. In America, most universities and even most institutes of technology require a one or two years of "liberal arts" education in any degree program. Few students enter a "major" in their first year of university training. Things are a bit different in technical schools, where training is specifically in the discipline.

However, one important difference between the "two cultures" of Snow's 1959 and the "two cultures" of 2009 is that science education was then (and remains now) a purely academic discipline, whereas IT education in the US can be obtained in a variety of ways. Typically any bachelor's or first university-level degree will have a large liberal arts component. For members of the ITP, understanding of the ITU will come from daily life, for the most part, rather than from academic training. Few offerings to members of the ITP contain any content oriented towards understanding the role, impact, function, responsibility, or worth of information and information technology in general society, even in liberal arts course. Courses that may be required of some members of the ITP may examine "social issues" or "ethics", but unless the lessons are reinforced through positive and clear examples, they are hardly going to survive as important bridges after this training.

For members of the ITU, any vague understanding of the ITP can stem from modern life, with its myriad computer-based, -enabled, and –enhanced applications. There are the ubiquitous "computer literacy" courses offered at universities, colleges, community and seniors' centers, voluntary organizations, service clubs and prisons; all provide some introduction to one or more applications under the heading of "literacy". Whether or not this kind of literacy is really anything like reading is controversial and is very much related to the "two cultures" challenge, if only because building the bridge across the gap from only

one side is dangerous engineering. Just having users understand "how computers work" is not sufficient to bridge the gap.

Secondly, beyond the lack of IT cross-training is a *lack of shared positive experiences*. A typical member of the ITU will experience information systems in two different ways: "I use an application and it's great; there are no problems" or "What a piece of garbage!" In the first case, there is little reason to explore the other "culture" – rarely are members of the ITU asked to contribute in meaningful ways to subsequent releases of systems that already work well. In the second case, interaction between ITU and ITP people generally suffers from all the communication problems noted by Snow, exacerbated by the pressure of modern life to get things done fast using information-based, enabled, and –enhanced system. When systems don't seem to work and when users have little recourse to getting them fixed, users manifest anger and resentment. Often individuals in the ITU try to become knowledgeable about IT either in self-defense, rarely out of interest. They become the office "computer guy" even when they aren't in any way members of the ITP fraternity. This might create more positive experiences for others in the office, but it doesn't build *shared* positive experiences.

A third cause of the gap, especially in the business arena, is the development of *IT ghettos*, areas of the organization into which members of the ITP are relegated and isolated from the rest of the organization. While most firms would deny this reality, the numbers clearly tell the true story. Very few members of the ITP ever become CEOs (Chief Executive Officers) of any non-tech firm. Few CEOs of modern companies have any vocational background in IT. Although there is some disagreement over the statistics, fewer than half of CIOs (Chief Information Officers) or individuals having a CIO-like position have a meaningful role in determining corporate policy or strategy. "Having a seat at the table" is the *cause célèbre* of the IT trade magazines. This seating varies depending on the industry, with information-rich industries such as banking and entertainment promoting CIOs to "table" status but most primary and heavy industries relegating the CIOs to reporting through Chief Financial Officers. The concomitant loss of prestige and benefits to the members of the ITP because of the relatively low status of their primary advocates is harmful enough. But by denying positive and regular interaction with CIOs leaves CEOs impoverished and information-disempowered, at the mercy of Boards of Directors and vendors when it comes to making decisions about IT. Even worse than potentially negative economic outcomes is the lack of contact itself, which leads to disinterest, or at least further isolation. This can only hurt IT governance, as an example of one critical aspect of IT. There is no doubt that most governance schemes, such as ITIL, focus on procedures rather than governance. This may be because the organization itself cannot be trusted to "do the right thing" with IT, because of a history of poor communication focused on problems, a lack of a common language and values, and totally different world views. This is the legacy of "two cultures", exactly paralleling Snow's description from 1959. Snow's reference to Tibetan is particularly apt, since (1) few people speak Tibetan, (2) Tibet is a long, long way from the West, and (3) Tibet no longer exists as a separate political entity. Each of these is a quality of the ITP, at least in business organizations.

The underlying causes can be addressed. It *is* possible for an IT person to interact meaningfully with users and it *is* possible for a user to argue for IT. However, it is unlikely to happen without a major shift in business values. For instance, for two decades, *alignment* has been either the top issue for CIOs or in second place. Aligning IT to corporate strategy is always on CIOs' minds, it seems. This lack of alignment is, of course, simply a symptom of the "two cultures." Generally, the emphasis is on "aligning IT to the firm" rather than the other way around. There is a large literature on this topic, too great to be reviewed here. There is, however, no literature on the opposite: aligning the firm to IT. And there is only a very small body of thinking about mutual alignment (Luftman, 2000, 2003, 2007). Keeping the alignment "problem" in mind, let's turn, once again, to Snow's lecture to see how these two cultures can be brought together, perhaps through lessons he pointed out half a century ago.

5 SNOW'S LESSONS

Snow's diagnoses and prescriptions may have some value in 2009. In this section we will review several of them and see how the lessons can be applied. In essence they boiled down to providing more science education in the schools. But given how little difference such education has made in ameliorating the gap between his "two cultures" since 1959, one may legitimately wonder about the effects of such education on the ITU-ITP "gap".

First, here's what Snow prescribed in order to reduce or ameliorate the "two culture" gap of 1959:

> [Twentieth-century science] has got to be assimilated along with, and as part and parcel of, the whole of our mental experience, and used as naturally as the rest. There is only one way out of all this: it is, of course, by rethinking our education. This [list], or something like [it], is the specification for the scientific revolution. First of all as many alpha plus scientists as the country can throw up. Second, a much larger stratum of alpha professionals -- these are the people who are going to do the supporting research, the high class design and development. Third, another stratum, educated to about the level of Part I of the Natural Sciences or Mechanical Sciences Tripos, or perhaps slightly below that. Some of these will do the secondary technical jobs, but some will take major responsibility, particularly in the human jobs. Fourthly politicians, administrators, an entire community, who know enough science to have a sense of what the scientists are talking about.

Snow advocated an increase in the number of scientists. But he also spoke strongly in favor of what might be called the "users-of-science community" -- politicians and administrators -- "an entire community" learning enough about science "to have a sense of what the scientists are talking about." And by this, he did not mean understanding the basis of particle physics. He meant enough understanding of the importance of particle physics to be able to make critical judgments. That is what politicians, government officials, civil servants and business leaders do: they make decisions among courses of action. Snow, naturally enough as a scientist-politician (and a scientist-administrator, too, during WWII), knew that these decision makers were influential enough and had enough clout to move the rest of society. Snow proposed educational programs both for scientists and for the "literary elite."

Was this effective? Unfortunately we have no way of knowing, because the intervening years were not kind to Snow's ideas as scientific hypotheses. No one did the experiment. Instead, the enormous ramp up in technological and applied-science development has culminated in a technology-oriented society, at least in most of the West. This seems to have completely obviated the apparent need to understand science. America, for example, is a society that literally runs on technology. For example, the Internet is rapidly replacing the shopping mall as the price of fuel rises. America looks to technology for solutions to almost all social problems (for example, tethering of convicted criminals instead of imprisonment, high-tech medical care instead of nursing, e-learning instead of wide-spread education, for example). Yet decreasing numbers of Americans enter science and engineering programs each year.

Snow was also ambivalent about industry and technology:

> And we know almost nothing about [the industrial society of electronics, atomic energy, automation. H] ighly educated members of the nonscientific culture couldn't cope with the simplest concepts of pure science: it is unexpected, but they would be even less happy with applied science…. Pure scientists and engineers often totally misunderstand each other….

> It is simply that technology is rather easy. Or more exactly, technology is the branch of human experience that people can learn with predictable results.

Yet even this "easy" pursuit, which pure scientists misunderstand as much as highly educated members of the nonscientific culture, is unpopular with members of the ITU. Here in America, for example, the management of ITU "culture" is increasingly content to outsource its information needs to India and to populate their schools of engineering and science with students from India and China, countries that Snow ironically had much to say about in the third part of his lecture, concerning the developing world.

So perhaps "education" is not the answer. Instead, consider the underlying message of Snow's argument in 1959. That message is that even a non-scientist who doesn't *understand* science (in depth) should understand *and be responsible for* the implications of his or her *use* of science. That is, members of the "literary elite" (which correspond to our ITU today) should at least appreciate the importance of science in contributing to the basis of their own activities. This is responsibility.

To this end, Snow proposed a sort of scientific (and to an extent technological) "Peace Corps" to go to what we now call the "developing world" and bring it into the modern "scientific" era. His proposal was to bring the vehicle of science -- the scientific revolution -- to the rest of the world:

> The West has got to help in this transformation [from half rich and half poor]. The scientific revolution on the world-scale needs, first and foremost, capital …including capital machinery. The second requirement is …trained scientists and engineers adaptable enough to devote themselves to a foreign country's industrialization for at least ten years out of their lives. [T]he third essential of the scientific revolution … is an educational programme ....With scientific teachers from this country and the United States, and … teachers of English, other poor countries could do the same in twenty.

In effect, Snow implied that while the individuals who might bring the "scientific revolution" (read here today "the Internet revolution") to the developing world would be "scientists and engineers", such a project would have necessitated the intellectual elite taking "stewardship" of science and technology. It is this stewardship idea to which we now turn.

"Stewardship" means the sense of responsibility that an individual has for the proper use and sustaining of a resource. We speak, informally, of being "stewards of the earth" when we refer to environmental responsibility. Similarly, it is possible to speak about "information" or "application" or even "system" stewardship in the same vein. Such IT-oriented stewardship builds a sense of responsibility and respect for information, information tools and, ultimately, information purveyors (i. e., members of the ITP) among the users (i. e., members of the ITU). Typically users expect the corporate IT unit to be responsible for designing, developing, distributing, and maintaining systems. For the most part, this responsibility rests well with members of the ITP. However, again typically, IT users *also* expect members of the ITP to be responsible for the *use* of the applications. The users certainly don't feel this responsibility. For example, few firms have active programs to reward innovation in IT use. Even fewer firms consider IT users as potential initiators and managers of IT development projects even when the users are paying for these projects. It is doubtful whether firms have sufficient maturity to understand the concept of application stewardship, so ingrained is the idea that an information tool is something that only the ITP should be responsible for. Yet the use of such tools logically cannot be solely an ITP responsibility; *it is also an ITU responsibility*. Programs encouraging stewardship are important. Successful programs of stewardship remove both major causes of the "two cultures" gap and thus ameliorate the harmful implications that Snow dreaded fifty years ago. The "two cultures" must explore each other's workplace reality. This is the

best reading of Snow's mid-twentieth-century advice for today's two IT cultures.

6 CONCLUSION

The gap described between ITP and ITU in 2009 is analogous to the "Two Cultures" gap of C. P. Snow's1959. The pairs of cultures (ITP/ITU in 2009 and "scientists"/"literary elite" in 1959) differ, of course, but the causes of the gaps are similar. The effects of the gap are analogous, too, and probably just as threatening. For example, did the ability to create and track mortgage-backed securities enable the recent large-scale meltdown in worldwide financial markets? Information systems provide the ability not only to create a large range of unregulated derivatives of questionable provenance, but certainly to manage and make marketable these virtual "securities." This is not the atomic Armageddon of Snow's subtext in 1959, but it could have analogous destructiveness if the economic system of the West (and Russia and China) comes tumbling down. One way forward may be to develop stewardship programs among users to increase user responsibility. Stewardship programs have an educational component as well as an experiential one. Not only will members of the ITU and ITP learn more about each other's "cultures", but by having common and positive experiences, they will come to value each other's way of understanding the world. Each employs information in a unique, but complementary way.

REFERENCES

Beaudry, A. and Pinsonneault, A. (2005) "Understanding user responses to information technology: a coping model of user adaptation." *MIS Quarterly* Vol. 29 No. 3, pp. 493-524.

Boytinck, P. W. (1980). *C. P. Snow: A Reference Guide*. Boston: G. K. Hall & Co.

Clayton, J. (2002). "Convergence of two cultures: A geeks' guide to contemporary literature," *American Literature*, Vol. 74, No. 7, pp. 807-831.

Davis, R. G. (1965). *C. P. Snow.* New York: Columbia University Press.

Glass, B. (1959) *Science and Liberal Education*. Baton Rouge: Louisiana State University Press.

Halperin, J. (1983). *C. P. Snow: An Oral Biography*. New York: St. Martin's Press.

Jasperson, Jon (Sean), Carter, Pamela E., Zmud, Robert W. (2005). "A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly*, Vol. 29, No. 3, pp. 552-557.

Lapointe, L. and Rivard,S. (2005). "A multilevel model of resistance to information technology implementation", *MIS Quarterly* Vol. 29 No. 3, pp. 461-492.

Leavis, F. R. (1963). *Two Cultures? The Significance of C. P. Snow*. New York: Random House.

Leidner, D. E. (2006) and Kayworth, T. "A review of culture in information systems research: Toward a theory of information technology culture conflict," *MIS* Quarterly, Vol. 30, No. 2, pp. 357-399.

Luftman, J. (2000) "Assessing business-IT alignment maturity", Communications *of the Association for Information Systems*, Vol. 4.

Luftman, J. (2003) *Competing in the Information Age: Align in the Sand*. Oxford University Press

Luftman, J. and Kempaiah, R. (2007). "An update on business-IT Alignment: 'A line' has been drawn." *MIS Quarterly Executive*, Vol. 6, No. 3, pp. 165-177.

O'Hear, A. (n.d.). *'Two Cultures' Revisited*. http://www.royalinstitutephilosophy.org/articles/article.php? id=19; accessed August 1, 2008.

Snow, C. P. (1959). *The Two Cultures and the Scientific Revolution*. New York: Cambridge University Press. Reissued in 1998 by Cambridge University Press with a preface by Stafan Collini.

Snow, C. P. (1971). *Public Affairs*. New York: Charles Scribner's Sons.