ICT Standards and the New Arms Race—the Rule of 3(+N)

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Abstract: *The quest for global standards is a time-honored and noble cause. International and National government agencies, Standards Developing Organizations (SDOs), and private sector industry coalitions (consortia) have made this quest a Holy Grail. In this article, I hope to show that Global as a prefix and objective for any ICT standard essentially dooms it to failure. Given the Information and Communications Technology (ICT) landscape now and that expected in the future, the best we can hope for is the Rule of 3(+N). This would be the three dominant regional power blocs—North America, Europe, and Asia/Pacific—utilizing national or regional ICT standards as strategic weapons in a new arms race to protect national and regional economic interest and achieve prominence in the global economy.*

THE VALUE OF ICT STANDARDS

The world we live in has undergone fundamental transformation in ten short years. In this time, we have morphed rapidly from a tethered, narrowband, and location and time dependent world to wireless, broadband, and always connected 24x7 global heterogeneous ecosystems. At least in the ICT community, we no longer see Wi-Fi, wired high speed Ethernet and Cable/DSL/Satellite connectivity, and reliable networks as a luxury. We see these elements as prerequisites to doing business and communicating and exchanging information—with anyone, anywhere, anytime. Many base their purchase decisions—such as hotels and airlines and even coffee shops—on the ability of these outlets to provide this connectivity. We willingly (or grudgingly) pay for it but the gating item is that it is available to us and it dictates our lifestyle choices.

This is not a news flash. Neither, I hope, is the fact that certain key ICT standards helped shape this new world. For an example, we can look to the Transmission Control Protocol/Internet Protocol (TCP/IP) suite—which includes Simple Mail Transport Protocol (SMTP), Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), and Telnet—together with Java and Hypertext Markup Language (HTML). These are the solutions that helped create the distributed environment we know as the Internet and the global commerce environment we know as the World Wide Web. We can point to 802.11b, GSM, and CDMA as the reasons we can now browse the Web, send email, and do business from coffee shops, hotel lobbies, and pool side—whether from PCs, PDAs, or mobile phones. DSL and Cable Modems help us telecommute to access corporate networks and files improve quality of life.

So, the productive value of ICT standards is not in question. A standard can be the secret sauce or glue for a perfect storm where buyers and vendors enjoy win/win success in a global marketplace. Buyers win because they no longer have to rely on and be tied to proprietary technology from a single, monopolistic source with unfair geographic and pricing power and a silo offering. They can source best of breed solutions from the Bay Area, Bratislava, Bangalore, or Beijing. Vendors win because they can unleash their hardware and software resources to create user mandated, price competitive, interoperable, and ergonomically and functionally attractive solutions versus developing to tired, rigid, and old technology.

The result is a multi-vendor ecosystem characterized by Darwinian behavior. Only the strongest survive, but the improved conditions in markets served by the strongest lead to larger revenue and profit pools for those left standing when the jungle consolidates after Darwinian competition.

STANDARDS AND FRAGMENTATION

Productive value is however only one side of the standards equation—it is also necessary to consider the impact of ICT standards on the supply-side. We can make a strong case that standards result in the fragmentation of global markets, and in an environment where control vectors to those entities with the greatest economic power and ability to influence the creation of ICT standards.

To begin, it is useful to understand who actually makes ICT standards. Until recently, it was easy to answer this question. Standards were set by:

- Governments and their national standards bodies like the Institute of Electrical and Electronics Engineers (IEEE) in the US
- Non-governmental organizations comprised of national standards bodies like the International Organization of Standardization ISO) and the International Electrotechnical Commission (IEC);
- UN and European agencies like the International Telecommunications Union (ITU) and the European Telecommunications Standards Institute (ETSI)

These organizations prescribed and followed documented processes for the approval of standards, and they established policies for the licensing of Intellectual Property and patents included in these approved standards.

The landscape began to change in the mid 1980s, with the creation of the Internet Engineering Task Force (IETF) in 1986 and the World Wide Web Consortium (W3C) in 1994. The IETF, which is an "open international community of network designers, operators, vendors, and researchers," focused on the creation of Internet Standards through the standardization of protocols and procedures. An Internet Standard is defined as "a specification that is stable and well-understood, is technically competent, has multiple, independent, and interoperable implementations with substantial operational experience, enjoys significant public support, and is recognizably useful in some or all parts of the Internet."[1] The W3C is open to all types of organizations. Italso allows for public participation, produces open web standards and guidelines for web languages and protocols—called W3C Recommendations—as well as sample code. Both organizations also specified the treatment of intellectual property in their standards and recommendation.

With the ensuing *global* explosion of the Internet and the World Wide Web, organizations like the IETF and W3C began to offer credible and valid alternatives to the national and international bodies for the setting of standards. This significant transformation completed in the 1990s with the emergence of industry consortia built to address specific ICT market segments. The national and international organizations involved accredited bodiesand IETF and W3C included individuals and all types of organizations. Industry consortia, however, involved primarily commercial entities—vendors and buyers. They focused on quicker Time-to-Market (TTM) solutions to spur the growth of tall and wide ecosystems around the specifications created through collaboration by their member companies. They also specified processes for the creation

of industry specifications by their members, and licensing terms for intellectual property owned by a member company and included in approved specifications. The Organization for the Advancement of Structured Information Standards (OASIS), the Object Management Group (OMG), the Open Mobile Association (OMA), and the DSL Forum are examples of the many hundreds—if not thousands—of consortia that exist today. Once primarily a US phenomenon, consortia are increasingly prevalent in Europe and Asia/Pacific.

So today, we have a melting pot—and polyglot—of ICT standards and standards sourcing entities. This is a highly complex and politically charged environment, and its primary effect is *fragmentation*—a very different result from the unification that standards supposedly drive. And fragmentation is everywhere. For instance, with Voice and Video over IP, we have H.323[2] from the ITU and SIP from the IETF with the ETSI TIPHON project thrown in for good measure. For mobile networks, we have GSM developed by ETSI and CDMA from Qualcomm. For video coding and compression, we have the MPEG standards from the ISO and H.264 from the ITU. Then we have various de facto standards—Sun's Java and Microsoft's .Net for web applications; Microsoft's Windows and Linux for operating systems, and Sun's Java and Qualcomm's BREW for mobile devices. Soon we will have competing solutions for Ultra Wide Band—Direct Sequence and Multiband OFDM; for next generation DVDs, where Blu-Ray and HD DVD are set to repeat the VHS and Betamax war, and alternative Digital Rights Management (DRM) standards reflecting competing commercial interests . And so on and on.

The reach of ICT standards is the driver for this melting pot/polyglot. While all the entities discussed above aim to create global standards, cold, hard reality gets in the way and in practice very few actual standards achieve this status. This is because:
- Standards always include Intellectual Property and the licensing terms and conditions specified by the various sources for standards vary. While Open Source, Reasonable and Non Discriminatory (RAND/RAND Z), and Royalty Free (RF) are the most common licensing mechanisms, they are often shaded differently. Additionally, each mechanism disintermediates some segment of the related industry. Therefore, if a standard allows for the generation of RAND fees by the IP holders, competitors will typically seek to disrupt that model by developing an alternative standard, perhaps with RF or Open Source terms.
- The right of IP holders to protect their Intellectual Property through patents and license fees is at odds with the needs of developers, whose primary interest is to deliver products and offerings with the lowest possible Bill of Materials (BOM). Accordingly, alternative solutions with positive impact on BOM begin to proliferate.
- Turf issues dictate behavior. As illustrated above, it is common for various standards setting entities to propagate alternative standards to accomplish essentially the same thing. It is also usually the case for consortia to practice that same behavior. National administrations also set country specific variants of a standard or create their own. The overarching interest of ownership of a particular space or protection of an economy also gives rise to alternative standards.
- Standards are created through a multitude of processes. Some are open, while others are closed and the ability to submit contributions is available only to certain participants. Additionally some standards are available to the public while others can only be accessed through paid membership in the setting entity. Less than universal access and availability further play into the development of alternative ICT standards by the disenfranchised.

These factors present real world obstacles to the global deployment of any standard and the establishment of a truly global standard. But, they are not the whole story by a long way. The globalization of trade via the Internet and World Wide Web, the presence of the European Union as an integrated economic force, the emergence of new powers like China and India, and the need for the rest of the world to react and adapt while protecting national interests also influence uptake. In this environment, the Internet itself and the World Wide Web may in fact be the last true global standards, with everything else subject to the particular interests of international bodies, regional, and/or national agencies, and consortia.

It is perhaps not just a matter of fragmentation. There is the very real new arms race to consider—where standards provide the means for commercial entities and nations to engage in competition and gain and protect economic advantage.

WHOSE GLOBAL STANDARD IS IT?

At the Meta level, almost everyone involved in developing standards appreciates their significance in global trade. In the US, the American National Standards Institute, ANSI, recently (March 2005) issued for public review and comment a United States Standards Strategy (USSS). It stated, "we realize that standards are inherently essential to a sound national economy and to the facilitation of global commerce."[3] The Standards Council of Canada, the German Institute for Standardization, the China National Institute of Standardization, in similar reports, make similar observations.

Issues arise at the next level. ANSI, in its USSS document notes that "Technical standards have become more prominent as potential barriers to market access for products and services. Differing technical standards can significantly raise the cost of exporting to and importing from international markets or even prevent market access."[4] The Standards Council of Canada in its Canadian Standards Strategy report observes that "Standardization plays a fundamental role in trade relationships, both positive (i.e., as an approach to meet multiple national / regulatory requirements) and negative (i.e., as a method to erect obstacles to the free movement of goods and services)."[5] As if to confirm, The China National Institute of Standardization defines this key task in its strategic plan. It says, "To develop independently self-proprietary technical standards through effective measures, so as to improve international competitiveness of China's technical standards and therefore increase the international market share of Chinese products."[6] And the German Institute for Standardization provides this telling statement "Standardization is also extremely relevant for the individual participants in economic processes, *since whoever makes the standards controls the market*."[7] The emphasis is mine.

Some of this is old news. Nations have long adopted conformity and type approval procedures to govern the interconnection of imported products to their telecommunications networks, for example. Electrical, environmental, and other standards have also existed for a longtime. These standards have undoubtedly served as trade barriers and—absent global standards—will continue to do so. What *is* news is the admission that standards makers control markets. If that is indeed the end run, it would seem to follow that we are not talking about global standards in the strict sense, i.e. those developed collaboratively and approved jointly in entities like the ITU, ISO, and IEC. It appears that we are talking more about asserting national or regional standards as global standards.

And so the question becomes, whose standard is the global standard?

Is it the one developed in North America, so it can continue its historical dominance in ICT around the world? That would seem romantic. Europe, with more than 450 million consumers and China, with over a billion, are unlikely to stand by and watch the US dominate as happened with IBM mainframes through the 1980s and more recently with computers, operating systems, and application software.

Is it the one developed in Europe? That is also highly unlikely. The US Department of Commerce published a report, "Standards and Competitiveness," in 2004. It noted that US participants in roundtables "expressed a perception that the EU has disproportionate influence in ISO and IEC because each EU national standards body has a separate vote and EU governments have well-funded technical assistance programs to promote their views on standards in developing countries. They felt that one vote-per-country in these organizations instead of representation based on market share allows regional biases to impact trade."[8] So even if the US does not acquire most of the rest of the world, and if the US is at least at face value a global citizen, it is difficult to see standards developed in Europe "going global."

Is it the one developed in Asia/Pacific? If so, from where in that vast region—China, Japan, Korea, Taiwan, Singapore, India, Australia and New Zealand—will that one standard emerge? Historically most of these nations have looked inward and enacted standards for their national stages. As yet, there is no centralized regional standards body like the European Committee for Standardization (CEN). And there is that pesky history of highly charged binary conflict between at least some of the nations to consider. So it is difficult to see a coordinated regional standards strategy emerging anytime soon. Perhaps it is enough here to utilize standards developed elsewhere—as long as they do not carry BOM hurting license fees—to either fill factory capacity and sell products or outsource software development from the West through an educated and skilled resource pool.

The Hitchhiker's Guide to the Galaxy is clear on this—the answer is 42.[9] Sadly, in fact, that may not be far from the truth. It is asserted here that while there may be international ICT standards, *globally accepted standards* may be a feature of our past. Specifically it is postulated that we are in an era where ICT standards are perpetrated through the **Rule of 3(+N).** The three in this rule represents North America, Europe, and China. These are the regional blocs with the power and influence at this time to dictate bloc level standards or variants of those approved internationally. The N represents a to-be-determined number of nations who, over time, pursue their own paths also.

In this model, the best we can hope for is for a Rule of 3—where the N trends over time to the lowest possible number, and eventually to zero.

UNDERSTANDING THE CHINA (AND INDIA) CARD

If the competing economic interests of North America and Europe is conceded—and accepted as two of the blocs in the Rule of 3—what remains is to consider the China card, and the one we can expect India to play.

Let's begin with China and let's begin with documented fact. The professional services firm Deloitte Touche Tohmatsu produced a superb report titled "Changing China—Will China's Technology Standards Reshape Your Industry?*"[10] While the firm refrained from providing a definitive answer (perhaps because that cannot be predicted with absolute certainty) the report did point out that "as the pre-eminent manufacturer of standards-based products, (China) is also a leading licensee. China's wish is to reduce the outflow of license fees, and also to earn some intellectual-based revenues of its own—from operating systems and software applications to storage media, wireless communications and satellite positioning, Chinese government agencies and companies are looking *to break the hold of developed economies on standards and working to shape new technology standards for economic advantage*."[11] The emphasis is mine.

The proof points are varied and many; They are documented in the Deloitte report and elsewhere:
- With operating systems, China has announced support for Linux (presumably to gain independence from Microsoft) but it has also announced plans to draft a China specific Linux standard that may be compulsory for all IT firms operating in China. The goal is to source or create software within the means of the population, and Windows licensing terms apparently do not meet that bar.
- With media, China has proposed Enhanced Versatile Disc (EVD) as the next DVD standard, essentially competing with HD DVD developed by Toshiba and NEC, and Blu-ray, which is supported by Sony, Matsushita, and Philips. While there are pricing, content, and technology obstacles to EVD, China is attempting to disrupt the royalties—which according to Deloitte are as much as $15-22 for a $60 player—manufacturers must pay and reflect in their BOM. In a similar vein, with audio video coding and compression, China is developing its own standard, AVS, to compete with ISO MPEG-4 and ITU H.264, and to address the ongoing and huge replacement value of MPEG-2 Codecs in multiple markets. AVS may carry license fees of 12 cents per system versus $2.50 for MPEG.
- With cellular networks, China's 3G standard, called TD-SCDMA, has already been ratified by the ITU. Here China accepts that its standard will have to work in conjunction with Europe's W-CDMA and the US CDMA2000 standards already deployed in China, but its existence has forced significant interoperability activity. China's experience with TD-SCDMA also positions it well to influence and create a 4G standard. In fact, China has already initiated an Asian 4G format in collaboration with Japan and Korea to position against the 4G standards being developed by the ITU.
- With satellite positioning systems, China has shown its power as a technology maker by choosing Europe's Galileo system over the US Military's GPS, with potentially huge implications for civilian and military applications.[12]

Not all Chinese "localization" efforts have led to success. In the Wi-Fi market, China has postponed previous plans to mandate its own security standard (WAPI) in products sold in China. In RFID, it is unclear whether China will pursue its own standard or accept existing international ones. The fact that foreign purchases of Chinese goods totaled $438 Billion in 2003, and continues to grow rapidly, undoubtedly acts as a counter balance in China RFID localization.

The scale and depth of the efforts should however leave no doubt about China's intentions. China has been driven by the need to reduce the Bill of Materials for the products it manufactures and thus make these products affordable in China. It has been motivated by its objective of reducing royalty payments to foreign enterprises and creating its own licensing revenue streams.

In addition, it has increasingly been willing to stake its own case so that it can present credible alternatives to existing technology and standards. Clearly, China has established through action and intent that it can easily be the third entity in the Rule of 3(+N), particularly if it continues to collaborate with Japan and Korea to lead an Asian bloc.

All this provides a fascinating backdrop as India begins to emerge. India is not close to matching China, Japan, Korea, Taiwan, and other Asian economies in manufacturing prowess for technology products. The required investments in plant, property, and equipment (factories) may make it impossible for India to catch up, much less leapfrog its neighbors. India has however carved out a lucrative and (at least in the short run) sustainable position as a "factory" for Business Process Outsourcing (BPO) and of course software programming—people are India's factory. Its vast pool of inexpensive (relative to the West) but highly educated engineers, historical affinity with English, and growing importance as a market with strong middle class purchasing power provide the foundation for its place on the world's technology stage. European, North American, and Asian firms continue to establish large local operations and step up hiring of local talent. There is, so far, no near term end seen to the economic boom India has enjoyed recently, and ICT has driven much of this success.

To date, India has been content to develop and ship software and goods back to their procurers. But then, China, Japan, and Korea all did that too, once upon a time. These countries have over time found their own voice and emerged as influencers of ICT standards and shapers of technology solutions they desire and need to meet local requirements. Therefore, it is reasonable to expect that over time, India will also follow the same evolution—leveraging the purchasing power of more than a billion people of its own, and an economy with far less trade restrictions and tariff barriers than at any time in its history.

We have not reached that tipping point yet. But, it can be projected that India will at some point exert considerably more influence over ICT standards—either on its own or in collaboration with other countries in the region.

If this happens, we will have our first N in the Rule of 3(+N).

IMPLICATIONS AND SUMMARY
To paraphrase Forrest Gump, "Standards are as standards do." ICT Standards unquestionably generate productive and economic value, and they are the baseline and substrate for interoperability of products developed by competitors. They help eliminate proprietary technology silos and unfair market power, they grow competitive ecosystems, drive innovation, and they improve market conditions by forcing competitors within an ecosystem to compete for business on price and usability factors. All that is well and good.

What ICT standards also do, it seems, is provide the means for stakeholders to fragment markets along national/regional economic lines. We are now in an era transformed by the knowledge economy and by the needs of each nation or region to ensure they are not marginalized or left in the cold as the global economy evolves. As we have seen, the developed economies—and the firms and entities operating in them—often have divergent and unaligned ICT standards alternatives available for consumption. Conversely, the developing economies seem intent on acting not just as consumers and mute or meek recipients of these standards. Their interest is in developing their own solutions to reflect their new economic power and local needs. While we

may continue to see international ICT standards emerge, it remains difficult to see uniformly implemented and globally accepted standards—like the Internet and the World Wide Web—take hold.

In a sense then, we could be in the early stages of a new kind of arms race. One in which ICT standards are the equivalent of the Intercontinental Ballistic Missiles in the cold war, and where SDOs, Consortia, and Commercial enterprises are de facto supporting players. Localized ICT standards can serve as a deterrent to market penetration and global wins by any one stakeholder, and can act to prevent the accumulation of wealth and dominance in a few hands. Conversely, they could serve as bargaining chips in higher-level negotiations—and lead to bilateral and multilateral agreements in trade, politics, and other areas. No matter how the global landscape forms, ICT standards will have much to do with its shape and mass.

The implications are most significant in the US. It has traditionally relied on demand-driven, voluntary consensus, and sector specific activities involving a broad range of participants—individuals, enterprises, SDOs, consortia, government agencies, and academia—to develop ICT standards. In its US Standards Strategy draft, ANSI outlines a series of valuable actions to establish a framework to advance trade issues, enhance consumer health and safety, meet stakeholder needs and advance US viewpoints internationally.[13]

However, these actions are not nearly enough. If this is indeed an arms race—and if ICT leadership is accepted as absolutely fundamental and vital to the US economy now and in the future—much more decisive action is necessary. To compete effectively with its international competitors, the US will have to recognize that standards are not an end in themselves—they are a means to an end—and redirect its focus from National Standards Strategy to **National Technology Strategy.** Standards will emerge naturally from a national technology strategy.

In accepting and acting on this precept, the US will have to get over its dislike of and distaste for practices its competitors have long embraced. These could include: five year plans; landscape assessments of technologies likely to emerge on the planning horizon, and those where the US is behind and needs to invest; and measurable milestones with funded and accountable centralized resources to drive strategy, tactics, and results on the global stage. This is accepted and expected behavior in Europe and Asia—major competitors with clear plans, as we have seen—for ICT prominence in the future.

Fundamentally, the path forward will involve a close partnership between government, academia, and commercial enterprises—this means the US will need to learn from its competitors and also require those who believe in strict *laissez fair* to "get over it." To quote Adam Smith—from his 1776 book *An Inquiry into the Nature and Causes of the Wealth of Nations:*

> "*Every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an* **invisible hand** *to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually*

than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good."[14]

We should note that Adam Smith is regarded as the father of modern economics—he was not a deranged insurgent.

In summary, a coordinated partnership between the private, public, and academic sectors with nationally mandated and funded ICT technology strategy and supporting programs is urgently needed in the US for sustained ICT leadership. If Adam Smith is dated, consider another proof point. In 1958, the US established the Defense Advanced Research Projects Agency (DARPA) to help maintain leadership in state-of-the-art technology and to "prevent technological surprise." DARPA funded something called ARPANET—a packet computer network—and that little something morphed over the years into the Internet, which drove the creation of the World Wide Web.

The rest, as they say, is history.

We are at a similar junction in ICT history now. The decisions nations and regions make in the next few years will define their relevance in the 3(+N) ICT sector as a new world evolves.

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[1] RFC 2026, "The Internet Standards Process—Revision 3," **http://www.faqs.org/rfcs/rfc2026.html**.

[3] American National Standards Institute, "United States Standards Strategy, Public Review Draft," **http://www.ansi.org/standards_activities/nss/usss.aspx?menuid=3**.
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[8] US Department of Commerce, "Standards and Competitiveness—Coordinating for Results: Removing Standards-Related Trade Barriers through Effective Collaboration," **http://www.technology.gov/reports/NIST/2004/trade_barriers.pdf**.

[9] Reference to a popular science fiction book in which a fictional computer spends millions of year calculating an answer to the "*Ultimate Question of Life, the Universe, and Everything*." The computer comes up with the answer, 42, and then states the problem is that no one knows what the question is. *The Hitchhiker's Guide to the Galaxy*, Douglas Adams (Ballantine Books, 1995).

[10] Deloitte Touche Tohmatsu, "Changing China—Will China's Technology Standards Reshape Your Industry?" July 2004.

[11] Deloitte Touche Tohmatsu, "Changing China—Will China's Technology Standards Reshape Your Industry?" **http://www.deloitte.com/dtt/cda/doc/content/DR_ChangeChina_July2004%281%29.pdf**.

[12] Ibid.

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[14] Smith, Adam, *An Inquiry into the Nature and Causes of the Wealth of Nations* (New York: A. M. Kelley, 1966).