INNOVATION AND STANDARDIZATION
YIN AND YANG FOR POLICY IN MOTION*

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Innovation and standardization can be set as Janus faces, back-to-back with each other, in a repeating cycle. A concatenated social architecture reveals the structure, with the cycle underway. The indicated policy 'in motion' can yield the best of competition and consensus, together.

Innovation and standardization can be set in a natural opposition[1] to each other – fruitfully so if staged across time, in an artful alternation.[2] Let's consider one of the more prominent cases, what I will call the IETF[3] approach to innovation and standardization.[4]

A cycle of innovation and standardization

The setting is the Internet; the time is a moment ripe for improvement. In a typical scenario innovative 'running code' will be proposed, after which a trial period ensues. There may be a competition with similar proposals (and certainly a competition with the established ideas), along with improvements based on trial results. After some period, the mode switches to standard setting. The appropriate group in the IETF takes responsibility, there may be a melding of the different ideas advanced in the trial, and a standard is eventually set.

There is a cycle between innovation and standardization. The activity in the first half of the cycle is creativity, experimentation and competition; in the second half, consensus-making for the standard. This cycle is the basic building block, repeating potentially countless times, for new ideas both big and small.

In a network environment, such as the Internet, this cycling between the innovation and some new standard is in fact essential. Innovation will in some way 'break' the existing standard, but the

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* Paper available for download at http://www.davidallen.org/papers/Yin and Yang.pdf and http://www.davidallen.org/papers/Yin and Yang A4.pdf (spaces in URL, please note). Published in *SIIT 2001 Proceedings – 2nd IEEE Conference on Standardization and Innovation in Information Technology*, p. 149, by the International Center for Standards Research, Boulder, Colorado, 2001.

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[1] Rather than 'opposition,' it would be equally accurate to say the two can be made natural 'complements.'

[2] Just ten years ago I wrote my original paper on this subject (Telecommunications policy between innovation and standardization, 1991). Though presented and circulated, I did not publish the paper; a number of subsequent papers to develop the ideas have spilled ink. This present paper is committed to bring forward those original ideas, invoking current examples. It presents the ideas in a new organization and also adds a further bit of analysis. (All the papers, except for that first, are available on my web site among other places. The first will be available there soon.)

It is important to note that not all scholars would characterize a natural opposition between innovation and standardization. A key example is at least one of the companion papers in this volume. The opportunity for dialog on these differences is a main purpose for presentations together, particularly to discover whether there may be resolutions as yet not found.

[3] Internet Engineering Task Force. Though the IETF is a handy way to refer to the phenomenon, similar practice can often be found in the numerous industry 'Forums,' each dedicated to handling a specific technical change.

[4] This approach or style has taken wider root and acquired even a name, Open Source. One of the seminal treatises comes from Eric Raymond, The Cathedral and the Bazaar, 1996. Although there are important ways that Open Source is different from the model here, key basic ideas are parallel.

current protocol is necessary to maintain connections across the net. A new standard restores connectivity, the essential function.[5]

Novelty – technical and social

When we speak of innovation, often we implicitly mean a technical innovation. For every even-partially effective technical innovation, there must be some social innovation. Usually the largest costs are associated with the individual / social adjustments necessary to take advantage of the technical innovation – this is particularly true if the technical novelty may have wide impact. We notice that the process of social adaptation[6] typically just begins at the point of adoption of a new technical standard, in other words at the end of the technology cycle.

If we are to be serious about understanding the phenomena writ large – especially if we do research for policy – the typically longer period of social novelty seeks at least equal place in our analysis, beside our look at technical innovation and standards. The social architecture, with its dynamics, is one of the sections below.

Roadmap

With the basic cycle as introduction, we turn now to the essential tension between its two elements. Next the social dynamics prove important. Finally, we consider policy in motion. The paper concludes asking, can it work.

Janus faces

Innovation and standardization, when used together in this fashion, are Janus faces, back-to-back with each other. Inflection points – the point of shift from one mode to the other – are their point of contact with each other. Schumpeter identified 'creative destruction';[7] we can see that marks the point of turn from the prior standard toward a next innovation. Petros Kavassalis has spoken of 'creative accumulation,'[8] the point of inflection where activity turns from competition to consensus.

If we put the cycle in economic terms, the innovation phase is comparable to the market; the standardization phase, comparable to a hierarchy. The creativity of innovation depends upon the flexibility afforded by a free market; its Janus face, consensus, depends upon the cooperative behavior and structured group decision-making that hierarchy may bring (the decision process in some firms could illustrate).[9]

Or if in social terms, then the 'joined opposites' are the individual in community. The individual expresses the creative idea which may beget an innovation; the group or community, to which the individual belongs, provides the structure and social protocols which may make consensus possible.

But at the same time, the risk-taking innovator most likely depends on an underlying stability of environment that hierarchy offers implicitly.[10] (The individual innovator also has a role to assume in the hierarchy, when the moment comes to make consensus.) And those who take a place in the hierarchy depend on future innovators to improve their status quo. (So that an individual in the hierarchy may find some new innovation bursting forth, even while deliberations for a new standard are winding down.)

It is in this sense that each phase contains the seed for the other, as the cycle turns repeatedly and the phases alternate with each other in succession. It is particularly in this sense that the two opposites

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[5] With networks the pure case, computers represent an intermediate case where interconnection is not strictly required. The broadest case includes 'normal' (non-networked) economic behavior. The focus here is just on the pure case, since the underlying purpose is exposition of the basic ideas. Application to intermediate cases – and indeed to the broadest case – yields some of the most interesting results.

[6] Everett Rogers' comprehensive work on the diffusion of innovation remains one of the beacons here. See for instance his *Diffusion of Innovations*, 1995.

[7] Joseph Schumpeter, *Capitalism, Socialism and Democracy*, 1942.

[8] See for instance his Mr Schumpeter on the telephone, 1997, with Richard Solomon. Phil Agre has also written on the essential cycle (see for instance The law of opposite numbers, 1999).

[9] Ideology in favor of 'everyone is peers' aside, the IETF process does indeed enable these two opposites: freedom for innovation alongside a hierarchy where a relative handful of people settle a standard.

[10] A conversation with Timothy Schoechle, January 2001, particularly highlighted this point.

are intimately connected.[11] So we now inspect this individual / social architecture and its dynamics more closely.

Social dynamics

There are two main cases. One is steady state; in that case the participants are relatively stable, and repeated rounds of innovation and standardization entail ongoing fragmentation and coalescence among roughly the same participants. The other case is expansion. Then some set of forces lead at least to attempts to widen participation, to expand the boundary of the implicit group.

Though steady state is a 'pure' case intended especially to clarify a baseline for thinking about the messiness of the real world, we can still point to examples. The evolution of the GSM mobile standard, once it finally got underway, is a case in point, with a fairly stable cast of characters. An example of expansion is the process that has led, so far, to ICANN.[12]

Steady state

As a baseline, steady state helps populate the analytic landscape. Steady state involves a collection of individuals or subgroups who are known to each other. The dynamics[13] between innovation and standardization mean there is a repeated fragmentation, then coalescence among the individuals / subgroups. *Together* they comprise the larger group of people who are interacting with each other in these steady state dynamics.[14]

Analytically, subgroups are concatenated within that larger group (and if we like, individuals are further concatenated within the subgroups).[15] Since innovation is one of our concerns, variety and its persistence across the course of standardization are notable. In particular, variety existing at lower levels in the social concatenation must be bargained away *only* to the extent necessary to reach a new standard. Other variety in views, disagreements, novel ideas and so forth, may continue merrily to persist at the lower levels. This variety may of course be a source for further innovation.[16] The European Union practice of subsidiarity is one of the hoariest examples of attempts to preserve local variety.[17]

In this sense, all standards are 'gateway standards.' While a given standard will specify more or less granularity to enable interconnection, regardless of its granularity it is also a 'gateway,' in that – in addition – it permits variety to continue at lower concatenations.

With object oriented programming as an example of a parallel architecture, we can see the conceptualization here is that of part and whole:[18] Sometimes the part is the focus – such as during innovation – and sometimes the whole is more the focus – such as during standardization. The dynamics produce looser or tighter affiliations among the pieces, depending on the phase of the cycle. We could speak of a 'network industry,' where there are implicit connections among the actors, sometimes looser, sometimes tighter.[19]

We can notice that the distinction between supplier side innovation / standardization and demand side social innovation has still not been drawn finely. Hopefully the foundation necessary for that analysis is now in place.

Expansion

Now the case of expansion is an extension of this baseline. A further example of expansion is 3G wireless. So far the effort to expand to a worldwide embrace for 3G has done little more than

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[11] In *Micromotives and Macrobehavior*, 1978, Thomas Schelling offers a classic on the derivation of group outcomes from individual behavior.
[12] http://www.icann.org
[13] Not the equilibria.
[14] Among economists, Mancur Olson produced some of the most extensive work on group dynamics. See his *Logic of Collective Action*, 1965. The topic is the stock in trade of sociologists and political scientists.
[15] This notices the impact of hierarchy, even during fragmentation, again confirming the intimate connection between the two.
[16] A key, much expanded discussion of tradeoffs for variety across time is left to other venues, such as Allen, Policy for access, 2001.
[17] However successful. Equally the United States federal system is another, earlier case.
[18] Or, foreground and gestalt.
[19] Charles Perrow (*Complex Organizations*, 1972) is one sociologist whose work on behavior in firms highlights looser and tighter affiliation; in the paragraph above the notion applies to industry relations, beyond the firm.

ensconce different approaches within a supposed umbrella; in some cases differences are not even papered over.

Expansion contrasts with steady state. In steady state, the overall group share a set of social (often implicit) protocols for resolving differences and reaching consensus. In expansion on the other hand, the would-be new subgroups (which might join in a new, larger grouping) likely do *not* share common approaches to problems such as the resolution of differences. The starting place must then be to cobble together shared approaches to such basic needs. It is not a surprise that an ICANN or the 3G standard faces real, extended challenges.

Policy

If innovation and standardization are – in Eastern terms – yin and yang, what are the policy prescriptions? Yin and yang are, as here, tensioned opposites containing seeds one of the other that, across time, turn one into the other in a recurring cycle.[20] Clearly such a policy will be 'in motion' – the policy regime will over time switch from one opposite to the other, to fit the essential dynamics.

One half – let's say the yin[21] – of our policy opposites, quite clearly, is our hallowed competition.[22] Innovation, in its phase, may flourish in the flexibility that competition can afford us. But instead of the commodity competition that forms the neoclassical foundation, our competition is over ideas, typically the new idea against the old – call it 'variety competition' instead.

The other half – the yang – is of course the opposite. To illustrate, let's *contrast* it with our usual expectations for *its* opposite, competition. Specifically, let's contrast it with that palpable symbol of competition, the 'marketplace':

- The marketplace is 'unconscious,' in the sense that there specifically is no visible hand. But the opposite policy regime will be pointedly conscious: joint choice is articulated among the community of those settling a standard – a winner is picked.
- That raises the question of goals used to make choice. The invisible hand relies on just the goals of an individual. By contrast, through whatever means the group uses to negotiate agreement, there will be some delineation of welfare for the assembly as a whole.
- Entry barriers are anathema in the theory of the marketplace. In a group? Communities build in initiation rights and entry 'standards' and generally maintain that which makes them distinct. Not only does that define who is in and out of the group, it maintains the 'standards' which define the group to itself. Entry barriers are of the essence; this lies at the very core of human organization.
- In the marketplace, speed of innovation and ultimately growth for profits and standard of living are the desideratum. (Indeed, speed requires the ability to transit deftly the cycle between innovation and standardization!) Some communities, by contrast, are at least equally concerned to maintain cherished ways, rather than 'speed' away from them.[23]
- That's speed; how about size? In the marketplace, bigger seems always to be better (even if the competition authorities try to insist otherwise). The community, instead, will generally require some 'fairness' across its membership, holding that benefits cannot accrue just to the most powerful.[24]

  With the expansion case the backdrop and globalization the ultimate bigness, the contrast between approaches to size is perhaps clearest. On the side that reflects the marketplace is the proselytizing salesman (or the religious zealot intent on more converts to some god). On the other are the recent protestors against globalization.

This has been a definition by contrast, to specify a policy regime for the standardization phase.

Policy in motion

Of course, this is a policy 'in motion.' *Both* policy regimes are essential; the cycle between innovation and standardization only works with them both. And one swaps out for the other, repeatedly

[20] Among others. With apologies to my friends from the East, who will straighten any error in my description.
[21] Switch them, to the opposite, if you feel the traditional interpretation fits better that way.
[22] Lest there be temptation to be cavalier, many, many have given their lives for the freedoms that allow us to take competition for granted.
[23] Not to mention, they may resist rates of change that are uncomfortable to assimilate.
[24] The recent protestors against globalization, though frequently incoherent, seem to hold this as a basic complaint.

over time. The yin of variety competition alternates with the yang of – what shall we call it? – community consensus.[25] And repeatedly. It is not one or the other, but *both*, across time.

The stark contrast between the two opposite regimes will feel uncomfortable, especially since we are steeped in the ideology of the market by itself. And an ongoing alternation between the two certainly feels peculiar. If we step back however, we see that the fundamental tension at play is unsurprising: The ongoing, repeated switch between innovation and standardization, market and community just fine-tunes the relative portions of order and (beneficial) chaos in economic and social life.

More important is whether our ideologies may be able to accommodate what are entirely radical notions by today's measure, in these policy prescriptions. Bob Putnam's remarkable effort to restore greater civic participation[26] suggests the answer may just prove to be affirmative. I particularly take heart that the ideologies dominant in American economic thought at the turn of the century (a century ago) were pretty much the opposite those that have prevailed the most recent half a century or so! Putnam's analysis is consistent, in my view anyway, with the proposition that ideologies can swing to match new(ly perceived) realities.

There are already threads suggesting new flexibility in economic thinking. Particularly notable is bestowal of the John Bates Clark award on a behavioral economist. After some decades with its proponents relegated to relative backwaters, a concern with realities of the human psyche, in the economic lens, has come into bright light. Outside the US, the French students call to rethink[27] has not only resonated widely, but has also engaged stalwarts of the orthodoxy. The body of work known as the Schumpeterian school, developed over decades now, stands ready to offer alternatives. These are some strands.

The remaining question is, will such a surprising 'policy in motion' work. The better question seems, do we expect human beings to behave otherwise? I look forward to discuss this.

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[25] So community failure joins the lexicon alongside market failure.
[26] See his *Bowling Alone*, 2000.
[27] http://www.paecon.net/