

## Communications/Information Technologies in the 'Knowledge Process' Tools for Value – and Job – Creation?

David Allen\*

How do communications technologies<sup>1</sup> affect employment? Let me count the ways ...

Employment reductions at a PTT, as liberalization proceeds, garner the most prominent – certainly the earliest and the politically most fraught – treatment in the press. In the US, the Regional Bell Operating Companies/RBOC'S<sup>2</sup> generated the headlines early-on, after divestiture in the first half of the 80's. Subsequently all telecoms actors together are reported to have shed a quarter million jobs,<sup>3</sup> spawning even learned treatises. Lately, AT&T has won the pariah's robes, announcing layoffs of 40,000, in parallel with its recent self-imposed, private tri-vestiture (though anecdotal information from within the company suggests that new hires, with different skills, have outpaced the layoffs). Traditionally, it is the phone company labor union(s) which sound(s) the tocsin, and organizes the stiffest resistance to plans for liberalization. This audience hardly needs to be reminded of the responses from labor at, for instance, Deutsche Telekom or France Telecom, or NTT earlier, where reductions of as much as forty percent of staff have been floated.

But the communications technologies infiltrate very widely indeed social/economic/political (and so forth ...) life in a developed society. The potential to impact employment – for good or for ill – surely occurs at too many points to count. As said, the impact on telco employment is the most immediately visible, upon liberalization – PTT's have after all quite often served as patronage catchment for regimes, around the world – and hundreds of thousands of jobs are vital, even more so when patronage and the political process are roiled. But the *significant* impact of communications technologies on employment takes place *outside* the telcos, most pervasively throughout a society.<sup>4</sup> And it seems likely that communications technologies may have the effect either to raise or to lower employment, depending.

### THE IMPACT ON VALUE CREATION

With the main impacts being throughout the economy, this paper investigates the role of communications technologies in one cornerstone of economic life – value creation. We are tempted to look for equilibria (perhaps our cognitive apparatus is more comfortable then), but between Heraclitus and Parmenides I conclude that “we do not

---

\* Co-Editor, Information Economics and Policy, 316 Heaths Bridge Road, Concord, MA 01742, USA;  
+1 978 287 0433 / +1 978 287 0434 - fax / David\_Allen\_AB63@post.harvard.edu

<sup>1</sup>Throughout, “communications technologies” as a less-awkward shorthand for “communications/information technologies.”

<sup>2</sup>As divested from AT&T.

<sup>3</sup>On the other side, the WEFA Group released a study asserting that liberalization in the sector will create 3.4 million new jobs by 2005. Attachments 1 and 2.

<sup>4</sup>A US preoccupation over the last years is “downsizing” – the restructuring of corporate organizations, particularly wholesale dismissals. Attachment 3 is a useful review. Therein, communications technology and regulatory liberalization are identified as two of the three *causes* of job loss (with increased foreign competition the third – small business is the job creator, in this review).

step into the same river twice” – dynamics are fundamental to successful conceptualization. In such a view, value creation and its dynamics (including the dissipation and redirection of value) are a building-block for economic outcomes. This paper is concerned with the role of communications technologies in value creation, and from that the impact on employment.

#### THE FOCUS: A “KNOWLEDGE PROCESS”

To make this investigation, the focus will be what I call the “knowledge process.” In prior work<sup>5</sup> I have suggested that information and knowledge need to be seen in the context of social connections and exchanges. Fundamentally, each person has a different experience of the world, and so each sees phenomena of concern with an eye that has some privileged access. Information is a confection of these mingled experiences; indeed the successful advance of knowledge depends intimately upon such joint effort. Nor can the mingling be avoided; the frameworks for thought – the categories into which raw perceptions are fitted – are a legacy of those who have come before. While the raw input is individual, the resultant – information – is conjoint. This argues for a grasp of the social exchanges, “the process,” if we are to understand information, and knowledge.

Our economic traditions have acknowledged as much. I particularly appreciate Don Lambertson's bringing to my attention Kenneth Arrow<sup>6</sup> on the subject. (Here I quote from Don's note to me.) Arrow especially applauds Rawls's Theory of Justice for arguing the “importance of the ‘natural complementarity’ amongst people because no one has all information.” Arrow further “draws comparison with a lesser version of the idea as in Adam Smith's division of labour thinking.” Don himself, in his own work, has gone on “(a) to link with consequential increasing specialization of labour as the central element of economic development, and (b) to note, as Arrow does elsewhere, that differences are the basis of all trade.” The Austrian school also takes the assembly of shared information as a major departure.

Though these our traditions have acknowledged the social nature of information in the economy, there remain, I will suggest, some implications and conclusions – including policy – yet to be drawn. The pervasive role of community in economic affairs holds intriguing prospects, notably for the discussion here as community underpins the evolution of information and knowledge. To unearth some of the mechanisms, this paper proceeds by inspecting key turns along the path as value creation unfolds.<sup>7</sup>

---

<sup>5</sup>“Beyond Competition: Where are We in the Dialog about Policy for Telecommunications?” in *Beyond Competition*, Don Lambertson, ed., Elsevier, Amsterdam, 1995.

<sup>6</sup>Kenneth J. Arrow, “Some Ordinalist-Utilitarian Notes on Rawls's Theory of Justice”, *The Journal of Philosophy*, LXX, 9, May 1973, 245-263.

<sup>7</sup>Without countervailing considerations, my preference would have been to structure the discussion in this paper more in what I believe is a European fashion – inductively, with the evidence preceding, and as the basis for drawing, conceptualizations that are located more as a conclusion. Reluctantly however I concluded that, this time anyway, I must do more honor to my US intellectual roots, and present some of the superstructure up front, in the interests of combining clarity with brevity. Additionally, I look forward to pointers from the other participants, toward other evolutionary work which may already go where this piece attempts to go.

THE TASK: KEY TURNS IN VALUE CREATION, COMMUNICATIONS TECHNOLOGIES IN THE KNOWLEDGE PROCESS, AND EMPLOYMENT

So the task is to inspect one after the other some key turns in value creation. The focus is the knowledge process. For our purposes we are interested in the insertion of communications technologies in that social process, then to judge the impacts on employment which emerge. Value creation has been selected as the locus for the investigation because it is a linchpin in economic dynamics, but selected especially since information flows – the knowledge process – are central to its operation. We try to understand the effect of adding communications technologies to the process, and thence the employment impacts.

- Two recurring subjects: Geography and hierarchy

Two subjects will appear recurrently, across the several steps through value creation and its evolution. One is the role of geography in the outcomes. The basic function of communications networks, after all, is to suppress geographical distance. The other, a more subtle effect here, is the place of human hierarchy versus organizational “flatness” (and so seemingly greater access, the liberal ideal).

To set the role of geography in some context: In the roughest terms, recent human history has seen, first, a migration out of agriculture and the bucolic expanses into the urban polyglot, particularly in response to industrialization (not that urban agglomerations were foreign to human nature in earlier times). That has proceeded over a few hundred years. Rather recently by comparison, transportation technology has helped re-disperse at least some middle classes to “the suburbs” (certainly in the US). The tether to a(n industrialized) physical work site has been loosened. Now some seers envision that communications technologies will make this geographic accordion further re-open, to allow much wider re-dispersal. With collaborations, via the Web, among members of a workgroup sprinkled around the globe, the possibility has to be given some credence. Sparse versus dense concentration, and the geography between worker and worker, and worker and home, are relevant variables for us, as a result.

As will emerge in the cases below, shifts between hierarchy and flatness underlie the evolutionary path of the knowledge process. This industry-organization structural “duality” is mirrored in the evolution of communications technology, between technical innovation and standards. But further regarding that is indeed best left to the cases.

Now to the key turns in value creation, communications technologies in the accompanying knowledge process, and impacts on employment. Policy implications are duly noted. Again, the knowledge process will be our focus, the conceptual anchor around which the rest is understood.

THE EVOLUTION OF VALUE

How can we characterize value creation? Consider an ‘ideal’ case<sup>8</sup> – a case, at least, where the innovative turns have flowed more quickly than virtually anyone has imagined, an astonishing flow of implemented innovations which continues to be sustained over years – the Internet and Web.<sup>9</sup>

---

<sup>8</sup>Without, for the moment, trying to justify that it is ideal.

<sup>9</sup>This is a case from communications technology, but below we will ask whether the logic can be expanded to not-so-obviously-networked markets.

- A value cycle

The value cycle begins with a fresh idea from, perhaps, one of the hackers who contribute their code, for a better 'Net. The new idea may generate a few alternative proposals. These ideas must compete with each other, to test them all. After some experience with the alternatives, the best of each is melded into a consensus proposal, ultimately to be promulgated by the Internet Engineering Task Force/IETF.<sup>10</sup> The cycle moves from innovation, and the competition among ideas essential to test the innovations, to a new standard, born of a consensus among the erstwhile competitors. Then the cycle can begin afresh, to sustain the remarkable run of innovation.

The participants act alternately as individuals, with ideas to test, and as members of the 'Net community, committed to a joint effort which will advance the state of the 'Net vehicle. They are alternately in a "flat" organization, where access for new ideas is paramount, then arrayed hierarchically (though I prefer "nested"), in a consensus necessary for the pieces all to interconnect.

- The 'nested' knowledge structure

The information flows among the individuals – the "knowledge process" – are one among the activities (besides, for instance, building hardware, writing code, and so forth) essential to successful value creation. A slice through the standards in place at any moment – a momentary flash freeze of the flow, for purposes of investigation – illustrates that there is also a 'nesting' of the shared "knowledge structure." This conceptual artifice mirrors *at each layer* the flexible-for-access / structured-for-coherence duality in human organization.

A simplistic example illustrates best. The 'Net interconnects – interconnection is its defining function – because it employs IP universally. At a next level up [this is an inverted nest], the 'Net is relatively agnostic to Operating Systems/OS'es – UNIX, PC, or Mac are all options. *If* some sub-community chooses Mac, Open Doc is available as a component architecture, in addition to DCOM. In a similar vein, at some next level, *if* a further sub-community chooses Open Doc, ... The same even obtains at the basic level – for instance Netware and its IPX can be the alternative to IP.

Schematically, the structure (illustrating just a single branch, from the bottom) is

and so forth  
same – *variety*  
same – *variety*  
same – *variety*

where "*variety*" represents the openness during the fluid period for choice, and "same" the ([sub-]community's) coherent choice when made. We might say the question is, how large is the diameter of Hotelling's circle.

The human-organizational building block, the (sub-)community, finds reflection, and vice versa, in the shared conceptual superstructure. The central task for understanding is to put the pieces into evolutionary motion – to grasp the dynamics (as the schematic insinuates, with its italicized period of fluid choice).

---

<sup>10</sup>An 'unaided' tipping point, a 'critical mass,' is a subset – but only a subset – of consensus.

- Policy

This is (somewhat abstruse) analytic machinery. More practical are the embedded policy dictates. The liberal ideal – universal competition and access – is only half right. Competition, particularly for ideas, must be paired with its Janus twin, consensus, during which the community “circles wagons” to reach a joint conclusion, for going forward.

Evidence that this is a live issue comes from unlikely places. Peter Passell, an economist who reports for the New York Times,<sup>11</sup> observes that “many economists have grown skeptical ... they worry that Mr. Clinton’s casual but often repeated equation of trade and warfare is tilting U.S. policy toward economic nationalism – a subtle form of mercantilism ...” This “... points toward a ‘hub and spoke’ trading order in which the United States dominates numerous regional preferential trade areas, rather than a worldwide system in which the U.S. economy is merely first among equals.” The US, *the* champion of competition, finds itself “circling its own wagons,” in the very teeth of free trade rhetoric. (Sub-)community proves, again, an irresistible half to human outcomes.

This message is amplified surprisingly close to our home in communications technology, from news about the WTO agreement on telecommunications, which was completed just this past weekend. Charlene Barshefsky, the acting US Trade Representative, trumpets the success: “U.S. companies are in the best position to ... win under this agreement”<sup>12</sup> ... and to take the jobs (rather than companies from other countries getting those jobs).<sup>13</sup> A headline story in the New York Times, the next day, allows Barshefsky to shift the focus from “commerce” to “exporting American values.”<sup>14</sup>

Despite juggernaut momentum toward competition as the ideal – and despite its being embedded in EU policies, along with the policies of many others around the world, particularly after the WTO negotiations – competition is only half the necessary policy, a crucial half, but only half. The US, the ideal’s champion, practices otherwise, just to illustrate. Jobs are most demonstrably at stake.

#### COMMUNICATIONS TECHNOLOGY AND JOBS – FOR GOOD OR ILL?

To return to our task: The hackers in our ‘Net/Web case alternately go their separate ways, with new ideas, then come back together, to find renewed consensus. Information flows among them are essential in both phases [we turn in a moment to some of the detail]. The (dynamic) structure of community/nested sub-communities is a fundamental in the flows and the outcomes from them. Our ultimate question is the impact of communications technology on these flows, and thence on jobs.

Technology is an enabler, a catalyst or trigger. But what it triggers depends upon predispositions the user brings to it – the “culture” of that person’s community.<sup>15</sup> Violence on television makes an example. Though the US and Japan each broadcast high

---

<sup>11</sup>Being sequestered in Jakarta, I found him via the International Herald Tribune, the first week in February ‘97. Attachment 4.

<sup>12</sup>Attachment 5.

<sup>13</sup>This is echoed in a Broadcasting & Cable report on “Clinton’s telecom goals for a 2nd term in office ...: [among them] open international markets for US telecommunications companies to promote the creation of good, high-paying skilled jobs in the US ...” September 23, 1996, page 23, from an ABI/INFORM abstract.

<sup>14</sup>Attachment 6.

<sup>15</sup>Some are sensitive to the use of “culture” as a variable. If not culture, then predispositions.

levels of television violence, the real violence in the respective societies is dramatically different. Analysts of the subject will cite intervening variables, to explain the different effects.<sup>16</sup> But that is just the point: outcomes from technology are mediated by such variables.

How and whether communications technologies affect employment will equally depend upon the predispositions which a peoples bring to their use of a technology.<sup>17</sup> The result may be positive or negative, depending. The assessments made below reflect both prongs of the possibilities.<sup>18</sup>

- Elements of the cycle

Though the discussion has focused on main features, the value cycle has numerous elements. After the original idea, other related ideas may be spurred. Prototypes may be built, to test each idea. Then ensues low volume production, for each version, and trial marketing, again for each type. Experience can lead to redesign, with both users and producers participating in the feedback. For a network technology, such as the 'Net and Web, consensus must be reached, among the competing ideas, to enable interconnection. Then production and marketing can turn to scale volumes. Regulatory rules and laws may evolve to shape use of the new value.

Communications technologies affect the flows within and among (sub-) communities at every stage, and so may affect the prospects for employment at each stage. Where are some main effects?

The subject is the stuff of ineffable influence in the deliberations of groups, and of individuals in their relations with the others. Hard data are not its essence. But impacts are nonetheless evident.

- Pump priming; tie-ins

In broad brush, the first half of the value cycle is 'pump-priming' employment. If some new idea succeeds to create 'new value,' in the form of a newly established product or service, the potential for employment in the second half of the cycle is probably manyfold. There can be a significant multiplier. Equally, once established there are up- and down-stream employment effects for new products and services with strong tie-ins – interdependencies – along its value chain. The need for computer speakers, sound boards and video cameras generates tied-in employment as multimedia begins to take hold from CD ROM's and the Web, for example.

If communications technologies in the pump-priming phase are taken up to encourage fruitful ideation, and then consensus solidly melds the best of several alternatives, the multiplier has greater leverage. If the communications tools restrict the ideas tried, and contribute to a prickly exchange over consensus, multiplier employment shrivels up.

---

<sup>16</sup>For some years, France's embrace of Minitel seemed another equally stark case of differential response, in the case, to videotex. Is the Internet the rest of the world's catchup?

<sup>17</sup>Since operation of the human group is at stake, the effects may also be expected to be deep cutting.

<sup>18</sup>As described in Attachment 3 above, Haltiwanger, Davis and Schuh have a new MIT Press book, *Job Creation and Destruction*, which delineates the US economy's very active churn in jobs, the result anticipated from Schumpeter (who certainly is in this paper's lineage). That churn is concomitant with the paper's analysis.

If the communications technologies encourage greater variety (as in the schematic above), the tied-in employment may be even greater. On the other hand, if the communications technologies are used to foment market dominance, the tied employment shrinks.

Again, a group's response to a given communications technology is pivotal in whether the outcome is for more or for less employment. Understanding underlying patterns of group exchange, and how that may 'play' with the new communications tools, is the starting point for micro policy decisions.

- Analysis at the element level

What of the effect by communications technologies on individual elements of the value cycle? Similar logic applies. During ideation, for example, some cross-fertilization may be encouraged via communications technologies. But inventors will also want some due recognition, which could be "stolen" where exchange is too facile. However as throughout, local practice will shape the specific outcomes for communications technologies which might be adopted for the element. Similar analysis applies down the line of elements.

The fact of the value cycle does offer some guidance – but in terms that use 'soft' terminology appropriate to the arena of group exchange. The communications technologies should encourage individuation, without isolating the person. Equally, they should strengthen group exchange, though not contribute to the group's potential to overwhelm. That prescription supports both ends of the cycle, the competition and the consensus (and so "good standards," among other desiderata). Though hardly dicta for an economics forum, key economic outcomes are in the balance.

- Isolation as a danger

To illustrate regarding isolation: Television and so-called walkmen both have some tendency toward isolation; television may isolate from neighbors, for instance, and walkmen from peers. Bob Putnam (a substantial portion of whose research is grounded in Italy) has made the issue famous in the US, under the rubric of 'civil society.' In a widely quoted article about "Bowling Alone," he points to the dangers of isolation. Telework, or telecommuting, may have the same effect. Though a recent article praised its benefits, another article cites survey results that 69 percent of respondents have jobs which are not suitable for telecommuting.<sup>19</sup>

On the other side, against isolation, a recent joint newspaper effort has created a trial national electronic labor market place, Careerpath.com.<sup>20</sup> Also, see below under the discussion of Europe directly, for extension to an *international* labor market.

- In operations

Operations (manufacturing, service delivery and so forth) get particular attention when communications technologies are the subject. As said above, the article on downsizing (Attachment 3) attributes job loss to technology, a sensitive topic covered

---

<sup>19</sup>Journal of Systems Management, July 1994, pages 30-34, as abstracted by ABI INFORM, and Attachment 7.

<sup>20</sup>Attachment 8.

further under the concluding brief discussion about Europe. The *End of Work*, by Jeremy Rifkin, elaborates how computing power has, and in the analysis of the book will thoroughly, decimate the ranks of manufacturing labor. In the approach here, unions are a formal sub-grouping, dedicated among others to preserving employment.<sup>21</sup>

- Rural development

Geography comes explicitly to the fore in five articles about efforts to improve rural life by using telecommunications to “import” higher value work. The best of those articles, about LaGrange, Georgia, is included. It describes the town’s purchase of a fiber backbone to try to attract “back office” work.<sup>22</sup> Such work could be done remotely, in LaGrange, though the resulting net architecture may not be optimal for the larger state of Georgia. The article lists eight related rural cases around the US.

#### NON-INTERCONNECTING CASES, TOO?

Our “ideal” case, the ‘Net and Web, is prominently a network technology. Interconnection is essential to its operation. The logic of consensus, necessary for that interconnection, is simple and compelling. Indeed, consensus is basis for the controversial policy conclusion above. But sectors such as autos or textiles carry no such explicit interconnection burden. Is this analysis still applicable?

Computers are a useful illustration. While computers do not require universal interconnection, a high degree of interconnection does nonetheless grow out of the economics. The result is large sub-communities of users, in a few “camps,” with further division into sub-sub-communities, and so forth. Computers are an intermediate case, falling short of the universality of pure networks.

But these are so far just supply side effects (such as the interdependency, in autos, among actors in the supply chain). There are also strong demand side effects. Pure fashion goods – such as clothing, in the textile sector – are the extreme. (Autos are also partially a fashion good.) Usually, effects from both sides are present to some degree.

In either case, of supply or of demand side effects, the analysis is of the communities and sub-communities (on *both* supply and demand sides) and the interplay between individual and group in the mix of competition/consensus, flatness/hierarchy. We have already seen that, professed ideology notwithstanding, the quintessential “competitor,” the US, also responds vigorously to dictates of its internal sub-group. That community-based behavior, endemic to humankind, shapes economic outcomes in large ways and small and ‘seeks a place integral to our analysis.’

#### COPING WITH CHANGE

If we pull back from the value cycle – to view, as it were, from the envelope around it – a key function for communications technologies can be to support coping with

---

<sup>21</sup>An article on unions in utilities, including telecommunications, concludes that these unions in the US have assembled substantial power, which they will likely extend into new businesses of the old monopoly, thereby extending the employment of their members. [The article cites no direct effect from communications technologies per se.] Attachment 9.

<sup>22</sup>Attachment 10.

change itself, overall. In this evolutionary view, pace is the fundamental variable to be chosen/accepted.<sup>23</sup>

The communications technologies may deeply influence the “atmosphere” in which value creation plays out. Television and movies, among others, are powerful influences; the Internet and Web may ascend to something approaching that position. Attitudes about sticking with the old ways, versus an openness and invitation to change – either can permeate. Since value creation is the basic engine for greater wealth, and hopefully enjoyment too, the pace of change that is ‘acceptable’ is fundamental.

At the root, communications technologies can play a role to help provide certainty, as a foundation on which change is more comfortable. Or, they may ‘play’ in just the opposite direction. Which direction directly influences the prospects for fruitful, or sterile, value creation, and so employment, or not.

#### EUROPE, AGAINST THIS PERSPECTIVE FROM THE US

US news reports are filled with Europe’s concerns about employment rates (to the extent that non-US news reaches these shores).

A sensitive intellectual debate in the US is locked tightly over what are the roots of our own growing distributional disparity. Is it precipitated by cheap labor from developing countries? Or alternatively, is the bane technology, particularly communications technologies, which rewards higher skilled labor?<sup>24</sup> Though there are some dramatic differences in circumstances, the same outline of the problem must figure in some part of Europe’s quest for solutions.

A Yank can hardly speak to a European situation, but the writing of the paper for Europe maybe makes speculation a natural denouement, to invite enlightenment from those who really know. The speculations are blue sky, but the dialog need not be.

If low wage rates in developing countries are siphoning off Europe’s standard of living,<sup>25</sup> the analysis here argues for putting the emphasis on enhanced value creation to produce jobs (using the many related tactics with communications technologies that have been touched above).

Pace seems a likely candidate for inspection too. The J Rifkin book cited earlier argues controversially for extending leisure (so, implicitly, not speeding up pace).

---

<sup>23</sup>A report on Southern California IS job openings nicely illustrates repeatedly-misguided attempts to adjust to (too quickly) changing and roller-coaster employment needs. Attachment 11.

<sup>24</sup>Attachment 12.

<sup>25</sup>Business Week, November 18, 1994, as abstracted by ABI INFORM, reports: Multinationals have trained their previously low-wage overseas help, so that now those individuals can compete in home markets. Telecommunications are making them accessible, to do so. Motorola, Hewlett-Packard and Philips are mentioned.