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TECHNOLOGICAL DRIVERS OF (R)EVOLUTIONARY CHANGE IN MODERN SOCIETIES AND HOW DEVELOPING COUNTRIES MIGHT PRODUCTIVELY RESPOND TO THEM VIA INTENTIONAL, THOUGHTFUL "LEAPFROGGING"*

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Abstract. Over the time since he was a fresh graduate student in the early 1980s till now, this academic has seen the world being totally transformed from an analogue into a digital "format". It all started innocently enough with large computers in rooms doing tedious counting and data-tabulating tasks on Hollerith cards while we humans carried on our analogue lives in relative peace. From 1985-1995, the world *did* change from an (largely) unseen tsunami begun from the small waves made by these nascent digital technologies. By 1995, the CD, audio digital recorders and DVD player had replaced earlier technologies. Computers (of a second or third generation) had replaced the typewriter; the Soviet bloc and its (long-decaying) governance models were only a bad memory (its economic model undone by technologies and demands of the new "third wave" post-industrial knowledge society). Finally, the worldwide web Internet 2.0 was arriving, which would surely change the means and modes of the communicative acts, affecting the economic, political and social/cultural spheres in turn. Using Kenneth Boulding, Marshall McLuhan and Johan Galtung as sage guides, the paper will outline the transformations these technical inventions wrought in the economic, political and cultural spheres in rapid order over the noted decade, considering how the "developed" world has been affected by these changes, both negatively and positively. Following this, it will briefly consider how the disruptive effects of the digital revolution experienced can be counter-balanced by looking at how "developing" communities and economies have been able to "leap-frog" barriers in how they use digital technologies for both individual and collective humanistic gain.

Keywords: Analogue to digital transition; Social change (appreciating or deteriorating); Developed/ Developing countries; Utopia/Dystopia.

1. Introduction: The Dodo Didn't Make It: The Disappearance of Developmental Niches in Society

In a provocative article in 1971 [1], social futurist Kenneth Boulding offered insights to the possible fostering of a sustainable socio-economic world order, versus the (very real) possibility that, like the proverbial Dodo, we would not

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"make it," i.e., survive, for we might, like the dodo, find that changing circumstances might do us out of the "niches" we (and our social-cultural orders) have come to inhabit. Boulding was not confident of knowing how to answer this larger question of ultimate human survival and, as for the issue of "human betterment", he was only slightly more encouraging:

I frankly despair of finding any single or simple rule of universal betterment. So I am proposing something a little more modest, that is, to try to identify subsystems within the total framework of the Universe and particularly within the framework of our society within which it is easier to determine whether things are going from bad to better or from bad to worse. For the total system of the Universe this may be very difficult to do, but for subsystems within it we may have some kind of chance. Can we identify what I would call deteriorating systems on the one hand or appreciating systems on the other? That is, can we identify particular processes within a society where there is wide agreement that things are either going from bad to worse or from bad to better? I think I have identified about eight of these. [2]

These eight items or vectors of either *appreciating* or *deteriorating* change, Boulding identified were: 1. Consumption/production systems; 2. "Goods" and "bads" (with bads increasing due to informational overloads); 3. Joint production of goods and bads; 4. Invisible (externalities) by-products of intended 'goods" production; 5. Failures in the knowledge-generating and distribution process; 6. Knowledge pollution; 7. The growth of malevolent (versus benevolent) value systems; and, 8. The payoff system (how are powerful people in the society paid, and from what area of the economy?) [3]. By walking through these eight vectors Boulding laid out the (r)evolutionary changes brought on by new technological drivers in our increasingly global society can be best revealed and described, and how certain social developmental niches that had worked well under one technological/economic system, came undone in the next.

2. Changing Consumption/Production Systems: The Three "Waves" Reconsidered

In *The Third Wave* [4], Alvin Toffler detailed the transition of human societies from hunter-gather societies (in which people were more of one with nature and the other animals of it, because they just passively took what nature provided them) to agricultural societies (where humans began to systematically cultivate or change the natural environment to increase productive outputs). This transition formed the first revolutionary wave of social, economic and political change (marked by settlements, formation of a priestly class funded out of excess food production and the rise of city-states and then feudalism). Following this same line of thought, the famed communication theorist, Marshall McLuhan [5], remarked that this first transition marked the move from a primitive oral culture to

the invention of alphabets and a small, elite manuscript culture dominated by the literate priestly class. Under this schema, the "goods" produced (excess agricultural production) lead to the beginning of a larger "culture" or civilization, in that not all people had to hunt, gather, or engage in subsistence agriculture. What calculation of "bads" versus "goods" that came out of this transition (such as growing social divisions and the scramble for the increased resources created) were subject to Malthusian economic law; that is, the population would grow and then fall in line with available resources [6].

The second revolution (or "wave" in Toffler's terminology) of industrialization was much more extreme and rapid, based on the exponential power of steam engines and their progeny mechanisms (large-scale, fast textile looms, locomotives, etc.) [7]. In the communication sphere, this development lead to what McLuhan called the "Gutenberg Galaxy" [8] by which the further mechanization of Gutenberg's single-page printing press was transformed into a mass-media production machine, engendering a matching need for literate consumption. In his introduction/summary of his comprehensive and compelling essay "On The Social Costs of Modernization: Social Disintregation, Atomie/ Anomie and Social Development" [9], Johan Galtung describes the process:

The modernization project launched by the West two centuries ago, was based on three pillars: State-logic, Capital-logic and Ratio-logic; formulated in part by Montesquieu (France), Smith (Britain) and Kant (Germany). The logic of the State implied centralization of coercive power, tempered by democracy. The logic of Capital implied market forces for economic power, tempered by anti-monopoly clauses. The logic of Ratio implied secularization for normative power. The result was spectacular, with bureaucracies, corporations and universities being major carriers of the triple logic, with ring-effects all over.

All of this was colored by Western deep culture, with its focus on dominion over nature; a sharp body-spirit division mirrored in a social division between merchants catering to the body, clergy catering to the spirit and aristocracy protecting both but also having ultimate power (whence grew Capital, Ratio and the State); social atomism (individualism) with hierarchic organization of people; epistemological atomism and hierarchic organization of ideas (deductive systems); a very dichotomous world image; and a religion/ideology seen as singularist (the only Truth) and universalist (valid for the whole world). Abroad "modernization" became Westernization, and with the recent predominance of Economic Man became identified with economic growth as the key program for the whole world [in] the last decades. [10]

Herein, one sees Boulding's development dilemmas very clearly laid bare; In the realm of technology (ratio-power), industrial wonders in the here-and-now undermined religious belief beyond; in the realm of economics, the abstractness of market forces undermined the mutual social obligations of feudalism (and the

later development of global corporate capitalism has undermined local social democracy) [11]; in the realm of politics, a false removal of economic structures from debate in the civic square has made the coercive power of the state [12], in turn, serve those corporate interests more than the social ones. Hence, industrialization processes have exponentially multiplied (in scale as well as reach) both the production of "goods and "bads" in Boulding's schema over what held in the agricultural revolution.

One item that marked the 19th and 20th centuries was the development of mirror-image societies created by social/economic divisions created by modernity. Out of the dislocations caused by the transition from feudalism to modernity, the divide between liberal market economics and individualism versus the command economies and collectivism of both fascism and then Leninist-Stalinist communism came to be [13]. While one could say that fascism was a retrograde irrational outgrowth of feudalism plus industrialization (but with a weak bourgeois class) [14], communism (first seen by Marx as a rational, evolutionary outcome of technologically advancing capitalist industrial societies, but then short-circuited by Lenin and Stalin to the case of Russia, still a feudal, agricultural society in the early 1900s), could be argued was the modernist progressive twin of market capitalist democratic societies [15]. The differing views of human nature that were revealed by these mirror societies (unique and individualist versus malleable and collectivist) derived from and then drove further what could be considered malevolent or benevolent values in their respective societies. But, as studies by a Byelorussian colleague and myself have shown [16], the core modern value that undergirded both systems was a resolute belief, almost mystical, in continuous human progress aided by expanding technology. And, up to the high point of post WW II "second-wave" industrial economies, both the USSR (reached in the mid-1950s) and the USA (reached in the mid-1960s), both modern industrial economies did well, productivity wise [17].

McLuhan too prophetically saw that the new technologies of communication in the 20th century (radio, film and particularly television) were not just different (neutral) *ways* to convey the same information that a manuscript or newspaper did, but modes of communication that would change the way humans *processed* information [18]. (Lenin, for example, did not get the 'message' that the "message was the medium," in promoting the development of radio in the nascent Soviet Union, he gave as his rationale that with it, "all Russia will be able to hear a newspaper read in Moscow" [19].) Through varied "hot" (radio and film) and "cool" media (comic strips, telephone and television), humans would either, in a psychological sense, be *dictated to* by the media (hot, high-definition media) or *invited into* it ("cool" low-definition media). This shift towards a more self-constructed psychology became the hallmark the third-wave cognitive psychology of Maslow, Rogers and Kelly, which all had as their goal the avoidance of two of

the twin "Gods" of modernity, i.e., the "irrational" lure of Freud (with its matching social system in fascism) or Skinner (with its matching social system in either totalitarianisms of centralized external control – think Orwell – or internalized self-managementt – hink of Huxley) [20].

In a recent article [21], Gilder and Hagger have explored the challenges facing such "situated selves" as Orwell and Huxley placed as they are between the modern Gods of individualism and collectivism as he or she tries to "make sense" of the fast-changing world that envelopes one, from which he or she, for a limited time in specific encouraging spaces (active adulthood in a free social-political state) perhaps can achieve an "episode" of consciously chosen free-born status. During the modern period, the West largely embraced the negative-freedom values of unencumbered liberty to speech and for freedom of conscience, while the modern East trumpeted the positive-freedom values of freedom from want and freedom from fear. It is, in this author's view, no accident that these four values (two negative freedoms and two positive freedoms) were the articulated aims of the Allies in fighting WW II, in which the two "rational" versions of scientific modernity were (temporarily) united in fighting "irrational" fascism and nationalism [22].

3. The Apex and Decline of a "Working" Modernity: 1945-1990

These modern values of World War II both deployed and were saved by adroit use of technological might, leaving (in the West) the United States (and by the 1960s, a rebuilt Western Europe) supreme economically. The combination of private economic corporations and large-scale regulatory governance structures, combined with an optimistic, trusting mindset on the part of the general populace (steeped in the self-regulating values of WWII era solidarity), lead to the creation of the welfare state, what Walter Russell Mead [23] has recently called the "blue social" model of state functioning. This social contract provided some space for guaranteed markets for corporations at agreed prices (a pattern set by military contracting in the War period) and good labor conditions for workers (guaranteed by union contracts). This was "second wave" industrially based social model that "worked" for most of the WW II generation and the baby boomers' generation afterwards [24]. While computers and the coming digital world was not far off, it seemed as if it were, even into the adulthood of this author. He thus calls this the modern, analogue world, drawing upon the technologies that were in most homes and businesses, up to the 1990s: analogue record players, tape recorders, televisions, and typewriters. In sum, the technologies employed by such appliances up to the 1980s were different only in degree from technologies used by their predecessors fifty years earlier. Many improvements were made in each, but the underlying analogue operating principle was the same, whether one discusses (in phonographs) the mechanical reproduction system used by an

antique Victorola, the tube/valve-based circuitry used by a Webcor hi-fi from the 1950s, or the transistors and integrated circuits used in a Bang & Olufsen stereo from the 1980s. For phonographs (and industries based upon them such as radio broadcasting), the major change came with the introduction of the digital compact disc in 1987. In a very short time frame of ten years, major manufacturers of phonograph players and changers (specifically lower-cost and mid-range ones) had either changed their manufacturing output or were forced out of business [25].

A similar analogue to digital transition affected other sectors, such as television and film, but perhaps most dramatically, the telephone. Before deregulation it the 1980s caused it to be largely dismantled, the American Telephone and Telegraph Company (AT&T) and its subsidiary, the Bell Telephone system was a shining example of the reach, reliability and innovation of American technology corporations [26]. Under "common carrier" legislation [27] derived from the postal service and railroads that had covered the USA, almost all homes in the USA had a fixed/wired phone by 1970 [28]. The phone company owned and maintained the equipment in the system, all the way from the switching station to the subscriber's bedroom; it was rented to the customer. Cross-subsidies of provided services meant that local phone service was universally cheap (even in far-flung rural areas) while long distance services were expensive [29]. Phone workers, from the operators and technicians to the engineers, were all well paid and secure in their unionized employment. It was a "blue-state" utopian welfare system in miniature. A 1974 anti-monopoly court case (ironically brought by the same federal government that had happily overseen its birth in 1875 and its expansion into the mid 20th century) was the immediate cause leading to AT&T and the Bell telephone system being divested of their co-monopoly in the USA on 1 January, 1984 [30]. What combination of forces speeded its demise, leading to what Mead calls a "red-state" (social-Darwinist, winner-take-all) system?

One force was the changing technology from analogue to digital, which made, by its vast expanse of the quantity of data being able to be transmitted for the same cost, competition easier (especially for long-distance phone services) [31]. The second was political change towards economic neo-liberalism in the USA (and Britain) [32], brought about by certain "bads" of growing globalization (oil embargoes in the early 1970s that quickly quadruped the price of oil products in the US being an exemplar [33]) and, thusly, high-level political failures grounded in colonial fantasies (such as the Suez Crisis for Britain and the Vietnam War, Watergate and the Iranian hostage crisis for the USA). By the 1990s, these forces had coalesced to form several specific drivers of far-reaching technological, economic, social and cultural change that have only amplified and extended the eight factors of social adaptation (for good or for ill) that Boulding had given us earlier on.

4. The Coming a "Brave New" Digital Atomistic/Anomistic World

These drivers of ongoing, exponential change into a "brave new" digital and digitized world include, first and foremost, the technology shift from analogue to digital just described (allowing for greater spectrum capacity and data transmission/copying without added distortion). Globalization (which is enabled by these lower data and memory costs, via Moore's Law [34], leading to ever-more communicative traffic capacity and lower costs, thus leading to more self-service customer interfaces and off-shoring of telecommunication-based services); Neo-liberal "economistic" politics which place abstract profits for abstract persons (corporations) before embodied, situated persons, due in part because, since 1990, TINA ("There is No Alternative") has become the acronym marking the "End of History/"The End of a Counter-Utopia" to mark the downfall of the Eastern Bloc and the Soviet Union itself in rapid succession [35].

In turn, this neo-liberal turn in economic politics has lead to the movement of ever-greater unknown systemic "manufactured" yet "incalculable" risks [36] from government to the individuals, with "casino" promise of high returns for the lucky or well-placed. Indicators of this process include factors such as: A. the move from defined-benefit pension plans and health-care insurance tied to stable jobs to "portfolio careers" for the prepared entrepreneurial few and lowly "McJobs" for the rest, with minimal health care insurance and defined-contribution retirement plans provided, if at all) [37]. B. the "unbundling" and "deskilling" of former professional "craft" (or "free") careers into "managed" semi-professional piece-work jobs (medical doctors working for profit-making Health Maintenance Organizations or HMOs, tenure-track full time professors being replaced by part-time and/or contingent instructors with low pay, while well-paid administrative ranks grow, and now even lawyers having professional opportunities dwindle in the face of preference for paralegals on-site and offshore document reviewing) [38]; and, C. what Robert Reich [39] had called "symbolic analyst" jobs (that were to be the oasis of secure work in the post-industrial age now upon us) have become ever more subjected to "extremistan" global market pressures as the knowledge "value-added" output becomes increasingly "scaleable" [40].

These macro-level shifts have occurred alongside micro-level movements from what Charles Handy has termed "doughnut-hole" structured jobs (with clear demarcations between on-work and off-work life activities) to "inverted doughnut" jobs that have few defined core responsibilities but endless peripheral ones which means that there is no clear dividing line between at work and off-work life activities [41], and to a growing power shift in favor of women as the "soft-skills" at which they tend to excel become more valued in the job market-place than the "hard skills" of brain and brawn that men tend to excel in [42].

In a poignantly apt word, the high working classes of the industrial age had been "decimated" at the close of the second wave economy, and in the third-wave economy 2.0 well underway, the "middling middle-management" class is getting the same treatment [43]. (Ironically, while there is some movement to bring selected high-ed, niche manufacturing jobs "on-shore" once more, information, and IT jobs are increasingly being off-shored or off-loaded onto ranks of the lesser-paid, smarter, or supposedly harder-working immigrants [44].)

It is the thesis of this writer that this very technology paradigm shift that, in his view (as detailed in his earlier work [45]) undermined the Soviet/East European governance model (because it could not allow for the creative freedom structures that engendered a Silicon Valley creative virtuous circle required by post-industrialization), has also, by its further implications, also damaged the same modernist roots of "classic" liberal market capitalism, via the exponential powers of structural changes in economies and technologies have changed the cost/benefit ratio calculations of production and labor as noted above. Following to the conclusion of Boulding's schema of appreciating or deteriorating systems [46], changes have to be made to the accounting of ecological invisibles/ externalities, to faults in knowledge transmission (and even malevolent) knowledge pollution, and most importantly to the "payoff system" to elites (and even others lower down the hierarchy) if we are to successfully navigate (in the developed world at least) the rough sea of ontological, epistemic and axiomatic changes ahead of both "self" and "sites" towards a humanistic safe harbor (or not), a journey which, at its conclusion, will provide an enacted answer to Boulding's hope of human betterment (or even survival).

Despite the gloom of Boulding, McLuhan and Galtung, there are glimmers of hope for new technologies to be used intentionally to build sustainable communities, both in sub-cultural communities in the USA (Amish) [47] and in the developing world (Barefoot University, India) [48].

5. Hope for Appreciating Social Change via Technology off the Beaten Track

In Galtung's cited essay on the ill effects of social atomistic anomie, he claims that humanity's long-held cultural/religious orientations (spaced along a transcendent vs. immanent continuum) have formed and can deform or reform social (trans) formations, resulting in four constructed categories of extant "ideal-type" societies, as driven by Alpha (dominant) or Beta (cooperative) psycho-social orientations [49]. Space here prohibits a detailed analysis, but it can be said that second-wave modernity has been dominated by a strong transcendent belief in science and progress, but weak on fostering embodied human relations (immanence). In his view, however, the historically recent move in the developed world towards an embrace of post-modernity has been a negative move because, while it has undermined both the religious transcendence of traditional (first

wave) society and the scientific rationality transcendence of modernity, it has not increased strength of grounded human communities [50]. And, the increased use of "smart" technologies of communication has come to be a pernicious symptom and/or accelerant of this loss of human immanence. But, it does not have to be that way. The intentional, thoughtful adaptation of modern technologies by sub-cultural communities in the USA such as the Amish has sparked many other organic 'communities' to question the inherent values residing in such mediums, as thinkers such as McLuhan and Jacques Ellul have pointed out [51]. Also, in the developing world, initiatives such as the Barefoot University (based in India) have clearly shown that, with the right support, illiterate women can be trained to perform (and train others like them to perform) the installation and maintenance of life-transforming solar-panel electricity micro-generators in remote villages, with the side-benefit that they become, over time, literate leaders in their communities [52]. With innovative (even utopian) thinking, appropriate third-wave technological resources (that can "leapfrog" unsustainable second-wave industrial development schemes) and a focus upon building community structures, still-bound traditionalisms can similarly be changed into open, adaptive living traditions, that can provide humans with a strong and adaptive balance between transcendent belief and immanent belonging.

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