r. buckminster fuller

Buckminster Fuller is best known as designer of the dymaxion house, dymaxion automobile, geodesic house; as geographer and geometer, etc. An integral view of the total process of man-world-universe is fundamental to his concept of the Comprehensive Designer as "an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist".

comprehensive designing*

The Comprehensive Designer emerges as the answer to the following problem (the greatest problem ever addressed by mankind): The Human Family now numbering 2¾ billion is increasing at an annual rate of 1% and trends toward 3 billion by the end of the second half of this century. Of this number 65% (at present approximately 1½ billion people) are chronically *undernourished*[1], and one third of them (at present ¾ of a billion people) are *doomed* to early demise due to conditions which could be altered or eliminated within the present scope of technology,—specifically, that area of technology comprising the full ramifications of the building arts, which now contains the negatives or blanks which match the lethal factors. *Relative to this premise, Nehru speaking recently in Chicago, U. S. A. said "it is folly to attribute the disquietude of the orient to ideological pressures". Nehru went on to point out that the de-energized and doomed are prey to any political shift of the wind that might promise arrest of their fate.*

At present all the world's industrial, or surfaced, processed and reprocessed functional tonnage (the *Industrial Logistics)* is preoccupied in the service of one quarter of the world's population though 100% are directly or indirectly involved in its procurement processing and transportation.

Historically, the trend of those to be served by industrialization is 0%→100%. The problem then is not one of countering the trend but of accelerating it exquisitely.

All the politician can do regarding the problem is to take a fraction of that inadequate ratio of supply from one group and apply it to another without changing the over-all ratio. The politician can of course recognize and accept the trend rather than oppose it, but this does not accelerate it, that is, in adequate degree to arrive at a solution in our day and generation,—and more importantly before deadline of the doomed.

All that money can do is shower paper bills of digits on the conflagration. Relative denominations neither decrease or increase the velocity of combustion.

How, and by whom if at all, may the problem be solved? Scientists are often charged with the task, but scientists as a class (irrespective of their proclivities as individuals) do not function in the *comprehensive* capacity, they function as *specialists* in taking the universe apart to isolate and inventory its simplest behavior relationships. Engineers function as *invoked specialists* in *reproducing* satisfactory interactions of factors ascertained as 'satisfactory' by *past* experience and a wealth of behavior measurement. Both engineers and politicians would lose their credit by society if they incorporated the unprecedented in wholesale manner.

We hear and read frequently in scientific and philosophic journals of the desirability for ways in which problems of universe may once more be approached by comprehensive and scientific principles.

A New Social Initiative

There emerges the need for a new social initiative which is not another function or specialization but is an integral of the sum of the product of all specializations, i.e., the Comprehensive Designer.

The Comprehensive Designer is preoccupied with anticipation of all men's needs by translation of the ever-latest inventory of their potentials. Thus he may quickly effect the upping of the performance-per-pound of the world's industrial logistics in four-fold magnitude through institution of comprehensive redesign incorporating all of the present scientific potentials that would otherwise be tapped only for purposes of warfaring, defensively or offensively.

In view of our myriad of performance-per-pound-advances of multifold degree (in contrast to percentage degrees) typified by pounds of rubber tire upped in performance from 1,000 miles to 30,000 miles expectancy without poundage increase (yet with complete chemical, though invisible, transformation) or of communication advance from one message to 250 concurrent messages per unit of cross-section of copper wire (and both of these multifold advances have been accomplished within a quarter of a century),

*A talk given before the Faculty Club of the Massachusetts Institute of Technology, January 19, 1950.

[1] *American Forestry Monthly,* November 1949.

FROM: TRANS/FORMATION—1950

it is seen as a meager technical problem to consider advancing the over-all efficiency of worldwide industrial and service logistics fourfold (to serve 100% of the population).

SOME MAY TEND to underestimate the comprehensive nature of the problem, saying the people are thus starving and we have the land capacity to raise the food. This conception voiced by the theoretical specialist or casual observer is without benefit of logistic experience. It is not just a matter of raising food but getting food to people, anywhere from zero to 25,000 miles distant. And then it is not just a matter of getting food *to* people zero to 25,000 miles away—it is a matter of getting it there at certain velocities; and it is not just a matter of getting it there at certain velocities, but it is a matter of getting it there on schedules in certain *conditions*, conditions of nourishing content, palatability and vital preservation. And even then it is not a matter of success concerning all the preceding conditions, for the dumping of a year's food supply in front of a helpless family huddled on the street-curb is but an unthinkable tragedy. The maggots appear in hours. And once again the continuing energy controls providing progressive freezes, heatings, etc. cannot be effected by refrigerators and stoves dumped in the street along with a year's tonnage of food. Obviously a world continuity of scientific-industrial controls resultant upon comprehensive and technical redesign is spelled-out as the irreducible minimum of solution.

For those who think that this minimum can be obtained through legislative enactment by the politician or by the establishment of new dollar credits and who are forgetful that the total world tonnage is already preoccupied with service of only 25% of the world-people, it is to be noted that the economic-statistical approach is at present being voiced by the press in conjunction with the historically unprecedented water-shortages of the great U. S. metropoli, New York and Los Angeles.

These are not problems unique to those cities, but symptomatic of the trend of the great industrial interactions. The economic-statistical solution voiced by the politicians and the news proposes further encroachments into the watershed origins through the rerouting of waters otherwise destined to lesser centers.

Ergo: typical question asked by the Comprehensive Designer is: what do people want the water for? They are using 100 gallons per day per capita, consuming only one gallon for their vital processes while employing 99 gallons to dunk themselves and gadgets and to act as a liquid conveyor system of specks of dirt to the sea. We note that scientists do not need water to dunk their instruments in, nor industrialists to dunk their machinery in. Are there not superior ways to effect many of the end purposes involving no water at all, and where water is found to be essential, can it not be separated out after its combining functions and systematically recirculated as chemically pure, sterilized, 'sweet' and clear, and with low energy expense or even an improved energy balance-sheet as a result of comprehensive redesign?

THE SPECIALIST IN comprehensive design is an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist. He bears the same relationship to society in the new *interactive continuities* of worldwide industrialization that the architect bore to the respective *remote independencies* of feudal society.

The architect of 400 years ago was the comprehensive harvester of the potentials of the realm. The last 400 years have witnessed the gradual fadeout of feudalism and gradual looming of what will eventually be full world-industrialization,—when all people will produce for all people in an infinity of interacting specialized continuities. The more people served by industrialization, the more efficient it becomes.

Positive Constituents of Industry

In contrast to the many negative factors inherent in feudalism, such as debt, fear, ignorance and an infinite variety of breakdowns and failures inevitable to dependence on the vagaries of nature, industrialization trends to "accentuate the positive and eliminate the negative" first by measuring nature and converting the principles discovered in the measurements to mastery and anticipation of the vagaries. Day and night, winter and summer, fair weather or bad, time and distance are mastered. *Productive continuities* may be maintained and forwardly scheduled. There are three fundamental constituents of industry; all are positive.

The first consists of the aspect of energy as *mass*, inventoried as the 92 primary chemical elements which constitute earth and its enclosing film of ever-alternating liquid-gaseous sequence.

The second fundamental component of industry consists of energy but in a second and two-fold aspect, i.e.: (a) energy as *radiation* and (b) energy as *gravitation*, of both of which we are in constant receipt from the infinite cosmic fund. Third and most important component of the industrial equation is the intellect-factor which secretes a continually amplifying advantage in experience-won knowledge.

Complex-component number one cannot wear out. The original chaotic disposition of its 92 chemical elements is gradually being converted by the industrial principle to orderly separation and systematic distribution over the face of earth in structural or mechanical arrangements of active or potential leverage-augmentation. Component number two, cosmic energy, cannot be exhausted.

Constituent number three not only improves with use but is interactively self-augmenting.

Summarizing, components No. 1 and No. 2 cannot be lost or diminished and No. 3 increases; net result *inherent gain*. Inherent gain is realized in physical advantage of *forward* potential (it cannot be articulated backwards; it is mathematically irreversible). Thus, industrial potential is schematically directional and not "randomly" omni-directional. Thus, the "life" activity as especially demonstrated by man represents an anti-entropic phase of the transformations of non-losable universal energy.

THE ALL-POSITIVE PRINCIPLE of industry paradoxically is being assimilated by man only through emergent expedients,—adopted—only in emergency because of his preponderent fixation in the direction of

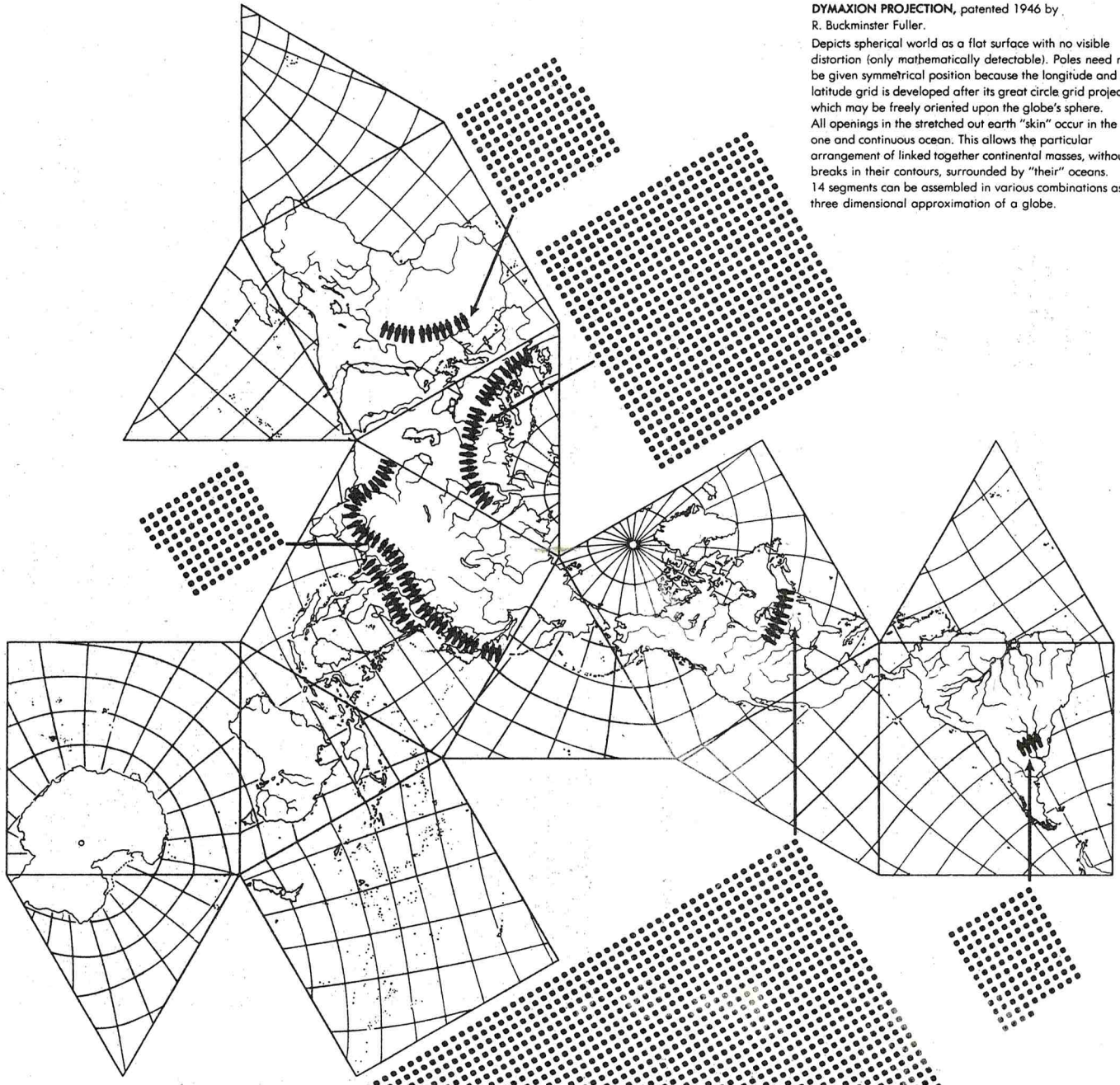
world energy map

on dymaxion projection (patented)

r. buckminster fuller

DYMAXION PROJECTION, patented 1946 by R. Buckminster Fuller.

Depicts spherical world as a flat surface with no visible distortion (only mathematically detectable). Poles need not be given symmetrical position because the longitude and latitude grid is developed after its great circle grid projection, which may be freely oriented upon the globe's sphere. All openings in the stretched out earth "skin" occur in the one and continuous ocean. This allows the particular arrangement of linked together continental masses, without breaks in their contours, surrounded by "their" oceans. 14 segments can be assembled in various combinations as three dimensional approximation of a globe.



= 1% OF WORLD ANIMATE POPULATION

The curved arrangement of symbols indicates roughly the major population concentrations (see pps. 38-39)

EACH DOT = 1% OF WORLD'S HARNESSED ENERGY SLAVE POPULATION (inanimate power serving man) IN TERMS OF HUMAN EQUIVALENTS (Total 3800%)

WORLD ENERGY MAP
by R. Buckminster Fuller

NAME OF MAP PIECE	POPULATION 1940	POPULATION 1950	% OF WORLD POPULATION 1940	% OF WORLD POPULATION 1950	ENERGY SLAVES POPULATION 1940	ENERGY SLAVES POPULATION 1950	% OF WORLD'S ENERGY SLAVES 1940	% OF WORLD'S ENERGY SLAVES 1950	% OF WORLD'S ENERGY SLAVES In Terms of Human Equivalents As Shown on Map) 1940	% OF WORLD'S ENERGY SLAVES In Terms of Human Equivalents As Shown on Map) 1950	SLAVES PER HUMANS PER AREA In Round Numbers 1940	SLAVES PER HUMANS PER AREA In Round Numbers 1950
ASIA	1,062,500,000	1,125,000,000	50	50	2,211,000,000	2,565,000,000	6	3	102	114	2	2
EUROPE	531,250,000	540,000,000	25	24	8,475,500,000	14,535,000,000	23	17	391	646	16	27
AFRICA AND MEDIT. WORLD	255,000,000	270,000,000	12	12	2,579,500,000	3,420,000,000	7	4	119	152	10	13
NORTH AMERICA	148,750,000	180,000,000	7	8	22,110,000,000	62,415,000,000	60	73	1020	2774	148	347
SOUTH AMERICA	85,000,000	90,000,000	4	4	1,474,000,000	2,565,000,000	4	3	68	114	17	28
CENTRAL AMERICA	21,250,000	22,500,000	1	1	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
ALL OTHERS	21,250,000	22,500,000	1	1	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
	2,125,000,000	2,250,000,000	100%	100%	36,850,000,000	85,500,000,000	100%	100%	1700%	3800%		

The map on the opposite page is a *dymaxion* projection. First published in *Life*, March 1943, the dymaxion projection is the first and only projection to receive a U.S.A. patent. Through its use, one may survey the whole surface of the earth with no visible distortion. This is to say that if direct comparison is made of the shapes and proportional size of the land and water masses with their counterparts on the surface of a world-globe, no physical difference will be detected. There is deformation but it is only mathematically detectable. Because the dymaxion map's longitude and latitude grid is developed after its great circle grid projection, the poles need not be given symmetrical position on the projected map. As the great circle grid may be freely oriented upon the sphere before projection, it is possible to arrange that the sinuses (openings in the stretched-out earth "skin") all occur in the *one* or *continuous ocean*. This makes possible the particular arrangement of linked-together continental masses, without breaks in their contours, completely surrounded by the "ocean".

Because one can see all the world at once (impossible with a globe), without visible distortion of its parts, any superimposed visual representations of statistical data are free of the false impressions usually obtained by looking at non-distorted proportional forms against a distorted background.

The special statistical data superimposed on the map is furnished by the metallic beads which appear in two categories of arrangement.

The first consists of relatively short strands of beads superimposed upon those triangles and squares containing the respective portions of the world's population. The other main category is comprised of plaited coils of metallic beads placed outside the surfaces of the map with their uncoiled ends leading to the appropriate area of the map to which they refer.

The first category of short strands contains 100 beads altogether. Each bead represents 22,500,000 humans or 1% of the world's population taken at 2,250,000,000 for 1950.

As it will be seen, the particular *square* of the map logically referred to as "Asia" contains 50 beads because 50% of the world's population live in the area represented. The 1,125,000,000 humans of "Asia" do not live precisely along the line where the beads lie. The curved line of beads only roughly approximates their line of position.

On the triangle which contains most of Europe and may therefore be called "Europe", there are 24 beads because 24% of the human population live in that area. It will be noted that a portion of land which we are used to thinking of as "Europe" is contained in the particular square which might be quickly identified as "Africa" because it contains approximately all of Africa but also happens to contain the "Mediterranean world", that is Italy, Greece, Southern France and Spain, Asia Minor and Arabia: to wit, all of the countries south of the large earth fault which we approximately associate with the line of Pyrenees-Alps and Caucasus mountains. This is quite a natural separation as this "Mediterranean world" is historically a world apart from the triangle which constitutes the later development known as "Europe." The square containing Africa and the "Mediterranean world" has 12 beads superimposed as it contains 12% of the world's population.

In like manner, the square comprising "North America" shows 8 beads superimposed, and the square identified by "South America" has 4 beads. The triangle identifiable as "Central America" has 1 bead.

So far we have accounted for 99 beads. One bead is missing because all the peoples in all the other 6 triangles and 2 squares together constitute less than 1% of the world population.

We are customarily impressed with the large aggregate of world's population represented by "Europe" and "Asia", for these two pieces alone contain 74% of the world's population. The diminutive number of 8 on the "North American" continent and the additional 5 of the other Americas (totaling 13) approximately balances "Africa's" 12% on the other wing of the map.

Category two of the superimposed data, the plaited coils whose ends lead to the respective areas whose data they modify, completely alters the significance of the information gleaned from category one. There are 3800 metallic beads in the 5 plaited coils. This is because these beads represent what might most appropriately be called the "energy slaves" serving man, — and outnumber 38 times the man population which they serve.

An "energy slave" is determined as follows:

In addition to the energy spent from his metabolic income in "working" his own body, one man in one 8 hour day can do approximately 150,000 foot pounds of work. A foot pound of work equals the amount of energy required to lift one pound one foot vertically. This additional work might be called his "net advantage" in dealing

with environment. The "net advantage" potentially to be gained by each human each year, working 8 hours each of 250 days per year, is 37½ million foot pounds.

Stated with a probable error of less than 10%, the world consumption of energy from mineral fuels (coal, oil, gas) and water power for the present year (1950) will be 80⅓ quintillion foot pounds (80,156,250,000,000,000,000 foot pounds). Assuming man's efficiency in converting his gross energy consumption into work to average an over-all 4%, he will net therefrom 3⅕ quintillion (3,206,205,000,000,000,000) foot pounds.

Dividing this figure by 37½ million foot pounds (each man's net annual energy advantage), we receive the figure 85⅓ billion man year equivalents of work being done for him. The 85⅓ billion man equivalents we will call 85⅓ billion "energy slaves".

$$\frac{\text{85⅓ billion energy slaves}}{\text{2¼ billion world population}} = \text{38 energy slaves per capita}$$

However, these energy slaves were not divided up equally in their service to each man on the face of earth as the above tables will show. Marked contrasts are to be seen in the table, – e.g. each of the 180 million "North American" inhabitants is served by 348 energy slaves (1400 per family) while each of the inhabitants of "Asia" is now limited to the services of 2 energy slaves.

To further appreciate the significance of this table, it must be noted that "energy slaves", though doing only the foot pound equivalent of humans, are enormously more effective because they can work under conditions intolerable to man, e.g. 5000° fahrenheit, no sleep, ten thousandths of an inch tolerance, can see at one million magnifications of man's vision, 400,000 pounds per square inch sinuousity, 186,000 miles per second alacrity, etc.

What is the world energy picture? North America, though running out of its petroleum resources, has domestic mineral fuel resources for 1000 years at present rate of consumption. Despite this energy wealth, it will trend after a few decades toward less energy consumption while upping standard of living through increased technical efficiency of energy use, with net energy for exporting, a condition already obtaining in many of its above-and-below-grade mineral resources and industrial products and services.

World petroleum resources will gain but will be augmented by other mineral fuel resources to approximate the same per capita wealth for rest of world as is now known to exist in North American continent.

World per capita consumption will trend to equivalence of North America by end of century with world equivalence in standard of living. World population trends to 3 billion by end of century, and even if trending to 4 billion by end of 21st century, world wide man may continue to up his standard of living indefinitely (without recourse to atomic power–his capital account)–through 16% success in converting sun energy receipts by metabolic processes throughout the arable, temperate and tropic areas.

(cont. from page 19)

tradition. Backing up into his future, man romantically appraises the emergent dorsal sensations in the negatively parroted terms of his ancestors' misadventures.

Essence of the principle of industry is the principle of *synergy* (Miriam Webster: "Cooperative action of discrete agencies such that the total effect is greater than the sum of two or more effects taken independently"). The principle is manifested both in the inorganic and organic. The alloying of chrome and nickel and steel provides greater tensile strength than that possessed by any of its constituents or by the constituents in proportional addition. Three or more persons by specialized team work can do work far in excess of the work of three independently operating men. Surprisingly, and most contradictory to the concept of feudal ignorance, the industrial chain's strength is not predicated on its weakest link. So strong is the principle that it grows despite a myriad of superficially failing links! In fact there are no continuous "links" in industry or elsewhere in universe because the atomic components are,–interiorly, spatially discontinuous.

The strength of "industry" as with the strength of the "alloy" occurs through the cocentric enmeshment of the respective atoms. It is as if two non-identical constellations of approximately the same number of stars each were inserted into the same space making approximately twice as many stars, but none touching due to the difference in patterns. The distances between stars would be approximately halved. It is the same with alloyed atoms whose combined energetic cohesion increases as the second power of the relative linear proximities of the component parts. Though the parts do not "touch," their mass cohesive dynamic attraction follows the gravitational law of proportionment to second power of the distance apart of centers. Therefore, alloying strength is not additive arithmetically but is advantaged by gravity which as Newton discovered is inversely proportional to the "square" of the distance apart.

MAN HAS NOW completed the plumbing and has installed all the valves to turn on infinite cosmic wealth. Looking to the past he wails, "How can I afford to turn on the valve? If I turn it on, somebody's going to have to pay for it!" He forgets that the bill has been prepaid by all men through all time, especially by their faithfully productive investments of initiative. The plumbing could not have been realized except through *absolute prepayment* of intellectually organized physical work, invested in the inherent potentials of nature.

Epochal Transformations

Not only is man continually doing more with less,–which is a principle of trend which we will call "ephemeralization,"–a corollary of the principle of "synergy,"–but he is also demonstrating certain other visible trends of an epochal nature. Not only does he continually increase literacy but he continually affords more years of more advanced study to more people. As man becomes master of the machine–and machines are introduced to carry on every kind of physical work with increased precision, effectiveness and velocity,–his skilled crafts, formerly intermittently patronized, graduate from labor status to continuity of employment as research and development technicians. As man is progressively disemployed as a quantity production muscle-and-reflex machine, he becomes progressively reemployed in the rapidly increasing army of research and development,–or of production-inaugurating engineering–or of educational and recreational extension, as plowed-back increment of industrialization.

Product and service production of any one item of industry trends to manipulation by one man for the many through push-button and dial systems. While man trends to increasing *specialized function* in anticipatory and positive occupations of production, he also trends to *comprehensive* function as consumer. Because the principle of industry improves as the number of people it serves is increased, it also improves in terms of the increase of the number of functions of the individual to which it is applied and it also improves in terms of its accelerated use.

THROUGHOUT THE WHOLE history of industralization to date man has taken with alacrity to the preoccupation of the specialist on the production side of

the ledger, but the amplifications of the functions of the individual as comprehensive consumer have been wretched and jerked and suffered into tentative and awkward adoption in the mumbo-jumbo and failure-complex of obsolete feudal economics. Up to yesterday man was unaware of his legacy of infinite cosmic wealth. Somewhere along the line society was convinced that wealth was emanating from especially ordained mortals to whom it should be returned periodically for mystical amplification. Also with feudal fixation man has looked to the leaders of the commercial or political states for their socio-economic readjustments,—to the increasingly frequent "emergencies."

Throughout these centuries of predominant ignorance and vanity the inherently comprehensive-thinking artist has been so competent as to realize that his comprehensive thoughts would only alienate him from the economic patronage of those who successfully exploited each backing up into the future. The exploiters, successively successful, have ever attempted and in vain to anchor or freeze the dynamic expansion at the particular phase of wealth generation which they had come to monopolize.

The fool-hardy inventors and the forthright prospectors in humble tappings of greater potentials have been accounted the notable failures. Every industrial success of man has been built on a foundation of vindictive denouncement of the founders.

Thus the comprehending artist has learned to sublimate his comprehensive proclivities and his heretic forward-looking,—toward engagement of the obviously ripening potentials on behalf of the commonwealth. The most successful among the artists are those who have effected their comprehensive ends by indirection and progressive disassociations. So skillful have the artists of the last centuries been that even their aspiring apprentices have been constrained to celebrate only the non-utilitarian aspects of the obvious vehicles adroitly employed by the effective artists to convey their not so obvious but all important burden.

THUS THE LEGEND and tradition of a "pure" art or a "pure" science as accredited preoccupation have grown to "generally accepted" proportion. The seemingly irrelevant doings of the pure scientist of recent decades exploded in the face of the tradition of pure mathematical abstraction at Alamagordo. No one could have been more surprised than the rank and file of professional "pure" scientists. The results were implicit in the undertakings of artist-scientists whose names are in the dim forefront or are anonymous in the limbo of real beginnings. How great and exultant their secret conceptioning must have been!

The Time Has Come

Now the time has arrived for the artist to come out from behind his protective coloring of adopted abstractions and indirections. World society, frustrated in its reliance upon the leaders of might, is ready to be about-faced to step wide-eyed into the obvious advantages of its trending. Ergo—the emergence of comprehensive training for specialists in the husbandry of specialists and the harvesting of the infinite commonwealth.

Will the comprehensive designer, forthrightly emergent, be as forthrightly accepted by the authorities of industrialization and state? If they are accepted, what are the first-things-first to which they must attend?

The answer to the first question is YES. They will be accepted by the industrial authority because the latter has recently shifted from major preoccupation with exploiting original resource to preoccupation with keeping the "wheels" which they manage turning,—now that the original inventory of "wheels," i.e. tools in general has been realized from out original resource. Though original resource-exploiters still have great power, that power will diminish[2] as the mines now existing above grade, in highly concentrated "use" forms (yet in rapidly obsoleting original design), become the preponderant source of the annual need. Severe acceleration in the trend to *increase of performance per pound of invested material* now characterizes all world-industry. With no important increase in the rate of annual receipt from original mines, the full array of mechanics and structure requisite to amplifying the industrial complex, from its present service to approximately one-fourth the world's population to serve all the world's population, may be accomplished by the scrap "mined" from the progressively obsoleting structures and mechanics. World-industrial management will be progressively dependent upon the comprehensive designer to accelerate the turning of his wheels by *design acceleration*. Each time the wheels go round the infinite energy wealth of cosmos is impounded within the ever greater receptive capacities of the 92 element inventory of earth and those who manage the wheels can make original entry on their books of the new and expanding wealth increments even as the farmer gains cosmic energy wealth in his seasoned cycles.

Answer to whether the designer will be accredited by political leadership has been made. Political leadership in both world camps has announced to the world of potential consumers their respective intents to "up" the standard of living of all world peoples by "converting the high technical potential to account through design."

Only the designer can accomplish this objective. Legislative mandate and dollar diplomacy cannot buy the realization.

As first of the first things, the designer must provide new and advanced standards of living for all peoples of the world. He must progressively house and rehouse two billion and one-quarter people in establishments of advanced physical control. The mechanically serviced sheltering must be a continuity of roofs, stationary and mobile, sufficient to allow for man's increasing convergent-divergent interactions of transciency or residence, of work, play or development, interconnecting every central of the world and penetrating to autonomous dwelling facility of most advanced standard even in the remotest of geography. The logistics of this greatest phase of industrialization must impound cosmic-energy wealth, within the inventory of 92 chemical elements, to magnitudes, not only undreamed of, but far more importantly, adequate to the advancing needs of all men. Implicit is man's emancipation from indebtedness to else but intellect.

[2] See *New York Times*, June 17, 1949, page 2.