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The Environment and System Response Capability

A Futures Perspective[1]

The world is in transition between an industrial and a postindustrial order. The degree of change involved is as great as that which, during Neolithic times, produced what Gordon Childe (1942) called the "urban revolution" when cities and written language first arose on a background of settled agriculture, irrigation and metallurgical advance.

The Industrial Revolution, of course, started the particular change we are now in. But only relatively recently has it begun to be realized—and not yet by the majority of people—that the advanced industrial societies which have been growing unabated through the last 150–200 years (albeit through depressions and wars) are not likely to persist too much longer without substantial modification. Our present pattern is not an end state, but a way station to a postindustrial order which will be built on radically different premises. It is quite possible, however, that we may not succeed in negotiating this passage, in which case there are a number of doomsday scenarios available to suggest what may happen to us.

Industrialism's Costs

The successes, the achievements of advanced industrialism are now producing increasingly dysfunctional and negative effects. Unless these are coped with by means as yet scarcely evolved, they will result in severe dislocations which will prevent the realization of a more beneficial future. Some dislocations are already beginning to manifest themselves.

We now have to think in world terms, to accept the advent of global interdependence. But the cultural heritage of the Industrial Revolution (in values, thought ways, policies, institutions and technologies) has left us unprepared for this. There is a mismatch. Much unlearning will have to take place before the

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way is open for new social learning to occur of a kind which can form the basis for constructing a viable human future.

Given the accelerating change rate, deriving from the information-based technologies of the Second Industrial Revolution, it is small wonder that the environment in all its many aspects has emerged as a major concern. These aspects include the economic, technological, organizational, urban, political, socio-cultural and ecological. As Dennis Gabor (1964) has said, "One cannot predict the future, one can only invent it" (or fail to invent it). In fact, there is no such thing as the future; only "futures." Which of the possibilities will be realized depends not a little on the choices we make—which in turn, depend on our values—and also on our taking an active rather than a passive role. The paradox is that under conditions of uncertainty one has to make choices, and then endeavor actively to make these choices happen rather than leave things alone in the hope that they will arrange themselves for the best.

Extrapolations of global trends tend to yield "disaster" scenarios. Things do not seem to be going to arrange themselves for the best. But it is the function of reference projections to disclose the areas in which the "continuous critical problems" of society are likely to become most acute (to use a term of my Wharton colleague, Hasan Ozbekhan [1969]). Reference projections make the case for intervention. At least that is how recent planning theory looks at them.

Shifting Viewpoints

But we did not think this way at all until a very few years ago. We took the wider environment as given. We thought it would stay put.

By the early 1960s, wider environmental factors were having so much impact on organizations involved in projects undertaken by the Tavistock Institute that my colleague Fred Emery and I (1972) felt compelled to extend our understanding of them (Table 1).

As the environmental field becomes more "richly joined" (in Ross Ashby's [1960] sense), as the parts become more interconnected, there is greater mutual causality (Maruyama, 1963). The denser the organizational population in the social habitat (and the more this itself is limited by the increasing constraints emanating from the physical environment which is no longer perceived as boundless) the more frequently do the many strands become enmeshed with each other in the causal texture of the environment. This means that forces from L_{22} (the contextual field) begin to penetrate the organization set (Evan, 1966) composed of the L_{21} and L_{12} relations with which the organization is primarily concerned. This creates what we have called "turbulence" for the organization whose internal repertoire (L_{11}) may only too easily lack the "requisite variety"

TABLE 1 The Set of Organization/Environment Relations

	L_{11}	L_{12}
	L_{21}	L_{22}
L_{11}	=	Internal Interdependencies
L_{21}, L_{12}	=	Transactional Interdependencies
L_{22}	=	Contextual Interdependencies

(L = Link; $_1$ = Organization; $_2$ = Environment)

for survival. Ashby's law of requisite variety states that when a system's response repertoire cannot match increases in variety emanating from the environment, that system's survival is endangered. This is our situation at the present time.

The contemporary world is characterized by much higher levels of interdependence and complexity than hitherto existed. These have led in turn to much greater uncertainty. The consequent variety overload is experienced by the organization and the individual alike as a "loss of the stable state" (Schon, 1971). It is producing increasing stress.

THE TURBULENT DECADE

During the 1970s turbulent conditions have become increasingly salient. Here are some examples:

- When the Organization of Petroleum Exporting Countries (OPEC) quadrupled oil prices, a long latent energy crisis became manifest.
- The international monetary system based on fixed exchange rates has broken up—a quarter of a century after it was agreed at Bretton Woods—causing the present turmoil of floating exchange rates, including the U.S. dollar devaluation. No alternative system to Bretton Woods is in sight.
- Stagflation has appeared—endemic and persistent inflation, along with endemic and persistent unemployment. Neither can be understood in terms of current economic models. No alternative models are yet available.

All these events—and there are many others—have come as surprises. They were not predicted. They are not understood. For this reason they create bewilderment, raising levels of anxiety and suspicion. Such is the experience of turbulence and loss of the stable state.

TABLE 2 Environmental Types

	Environmental type	*Survival mode*	*Market analog*
I	Placid, random	Tactics	Perfect competition
II	Placid, clustered	Strategy	Imperfect competition
III	Disturbed-reactive	Operations	Oligopoly
IV	Turbulent	(Negotiations)	(Macro-regulation)

Sources of Turbulence

- Large numbers of larger organizations pursuing independent (short-term) goals in societies based on continuous growth and expansion in a finite planet with R & D accelerating the change rate
- The communications revolution reducing response time and increasing information overload
- Regulatory mechanisms unable to cope with unanticipated consequences in interdependent sectors

THE EVOLUTION OF ENVIRONMENTS

Four generalized environmental types with different kinds of what we called "causal texture" may be distinguished. They are ideal types to which reality may approximate (Table 2). They grow from simple to more complex, from being poorly to richly joined. The level of mutual causality becomes higher with each step taken. Though they may exist simultaneously, historically the emphasis has varied immensely. In earlier times Type I and Type II were salient. Since the Industrial Revolution, first Type III and now Type IV have become salient. Types I and II are marginal in the contemporary world. They continue to exist in local niches (of which there are quite a number) or in outlying segregated areas.

- In the *placid, random* environment, goods and bads (goals and noxiants) are randomly distributed. As regards system response concerning survival, there is no difference between strategy and tactics: the optimal strategy is the simple tactic of doing one's best on a local basis. The market analog is perfect competition (the world of the small factory, corner shop, family farm).
- In the *placid, clustered* environment the field is still relatively unchanging but goods and bads are clustered. The survival mode becomes that of finding the optimal location, i.e., strategy becomes differentiated from tactics. The market analog is imperfect competition (businesses become more specialized and complex, seeking comparative advantage).