Simulating the Timing Effects of Public Policy Interventions[1]

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Introduction

Government acting at its velocity, expressed indirectly in the content or manner in which it develops defines and implements policy, can influence the development and growth of a policy area's institutions and processes, sometimes in a discordant way, as the latter evolve at their velocity. The problem lies in the disconnect between the velocity of government and its capacity to envision and manage complex regulatory and programmatic interventions, and the velocity of the regulated sector, producing unexpected often emergent future outcomes. The problem also lies in the failure to recognize that the two sectors co-evolve according to different temporal and spatial conditions. Most public policy simulations do not take these complex and co-evolutionary interactions into consideration. Ideally, adaptive governance permits the conscious patterning of an intervention to match the velocity of a regulated sector thereby achieving a desired future goal. Concepts drawn from complexity theory and "time-ecology" theory are proposed to investigate this co-evolutionary relationship. This approach suggests how organizational time and the rhythm and pacing of governmental interventions combine to produce unexpected outcomes.

The approach suggested here has been used to propose a new approach for developing California's trade policy, and for the delivery of community college economic development services.[1] The theoretical foundations for the paper, "Time, Complex Systems and Public Policy: A Theoretical Foundation for Adaptive Policy Making" will be published in the Journal for Nonlinear Dynamics, Psychology, and Life Sciences later this year.

Time And Public Policy Interventions

Long term political time creates policy windows as legislative, administrative, issue, party, electoral and political actor life-cycles merge.[2] Short-term political time seeks to achieve some future good within a highly cyclical and constrained legislative and policy context (legislative committee rules, deadlines, constitutional provisions, voter preferences, etc.).[3] Political time's duration, rhythm and pacing varies by policy project suggesting that clock time may be less important than the a measure that pegs and compares developmental

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processes and growth rates between government and organizations in a policy sector. Within this context, clock time particularly with its associated deadlines is a tactical weapon. Politics structures time, and by doing so, influences the evolution, growth and development in the sector that policy makers are interested in. Practically, this means the need for the right policy to be implemented at the right time with the right mix of resources. It suggests that there is a right time or *kairos* to act to achieve the best, most resource efficient effect in a particular policy area.

Complex adaptive system simulations that include significant real world political and policy area time components at various levels and scales may help guide political strategy. Simulations of real systems which focus only, for example, on economic development, on the industry-cluster side, and ignore the timing of legislative policy making or the life-cycle of government agencies will be unable to capture essential system properties or to help define the *kairos* for any particular policy intervention. Public agencies themselves have similar problems. For example, California State government is unable to recruit a highly trained information technology task force.[4] This means that the design and implementation of state computer systems or of electronic government lags far behind private sector standards, creating interface and other problems. A second example comes from the California's Business Enterprise Program. In this case, blind-clients being trained to manage restaurants continued to be thought of as people with a 1930s "tin-cup" rather than as entrepreneurs in training. This disconnect led to serious difficulties with program priorities and the ability to meet client's needs.

Public Policy Making and Implementation Are Embedded In A Time-Ecology

Government and its political activities are part of a larger time-ecology.[5] The time-ecology's various social, economic, technological, policy and other elements continuously come together at varying paces and rhythms at an instant in space, to form the present into the future.[6] These flows—this heterochronic interaction at various scales and levels as it were—shapes the development and growth of organizations throughout the time-ecology.[7] Politics seeks to influence socio-economic structuration at various future scales by intervening in the rates and flows of the associated time-ecology. Government itself is embedded in this same time-ecology too.

Each element such as an organization of a time-ecology has differing ways in which it emerges from the past and organizes itself to proceed into its unique future.[8] Each has a different past, with varying experiences, and expectations. Events vanish into the past in a different way. Some things that are past are remembered for a long time, others are quickly forgotten. The past may be present everyday or be quite remote. It may be packed with many memories or with few. The level of attachment to the past can have an affect on how quickly an organization moves into the future. Each has a different present. Some are very constrained to small issues at hand. Others are wide and consider broad policy or market landscapes. The present may be filled up with a large number of activities or few. The rate of movement of activities from the present into the past— production of new items for example—can be slow or rapid, just as the development of

new products can quickly move the firm into the future. Each organization has differing expectations for the future, and differing ideas about how well it can be controlled. Some organizations only look forward a few months, other look forward years. For some, movement into the future is rapid and continuous, with the past being rapidly left behind. Other organizations have just the opposite experience. Finally, the future may be filled with a large number of confusing opportunities or have just a few well understood ones.

Each of these factors in turn, uniquely shapes public policy making, the administrative process, and organizations being regulated.[9] For example, on the industry side, a smoke-stack industry may have experienced little past competition, not have very specific future expectations, move slowly into the present, holds on to outdated processes, and perceives the past as something they are favorably embedded in. Many of its processes and management elements will be dominated by this past perception. However, the future may actually be quite complex, limiting their ability to see far, leading to conflicting expectations, many difficult issues, a feeling of loss of control, and a sense of strong dissonance with the past. The past and future perceptions lead to a particular present that might be experienced by managers as narrowing, with a continuous link to and movement into the past but little movement into the future. It is important for policy making to be aware of the character of these temporal flows so that they can align with them, counter them, or in some other way use them to accomplish a future state.

California state government has experienced several major computer debacles, including the collapse of the Department of Motor Vehicles' $51 million system; the failure of the Statewide Automated Child Support System ($111 million in project costs and $90 million in federal penalties), and the cancellation of the Department of Corrections' Correctional Management Information System ($18 million).[10] A major cause is the inability to attract a trained information technology workforce who can manage and implement state of the art projects. In this case, it is the antiquated classification system designed for a generation of computer systems now long gone, and the accompanying pay scales that are driving current practices. State government remains firmly embedded in the past, unable to evolve to keep up with changing technology. The result is a severe interface and coordination problem with other government agencies and the private sector. Current policy making practices have not been able to address this problem.

Clearly, any effort to simulate public policy interventions in a given policy area, be it economic development or government agency information technology adoption, must take into consideration the co-evolving, interactive movement in the time-ecology they are embedded in as it continuously emerges from the past and flows into the future.

Even the way the future approaches may be problematic. The future will not be the same for each policy area or element of a government/policy sector time-ecology. Lane and Maxfield have identified three foresight horizons that might apply to any one of these elements, and even those change as development and growth occurs. This include: 1) Clear Foresight Horizon characterized by reasonable, expected outcomes where the necessary actions to deal with it are well understood; 2) Complicated Foresight Horizon

characterized by a condition where one knows what one is uncertain about, and the relevant actions and paths can be identified but the resulting outcome cannot; 3) Complex Foresight Horizon characterized by the continuous emergence of novelty leading to mistaken ideas about causative processes and where the relationship between action and outcome is tenuous and uncertain. Each future horizon appears to require a different organizational form and management style to deal with varying levels of uncertainty.

Clearly, a public policy time-ecology is a complex adaptive system. Many government and regulated sector entities acting in parallel, immersed in their own developmental and growth timing, interactively influence and co-evolve to determine the overall direction of their time-ecology. For example, the California State government's inability to respond to the information technology challenge has delayed the development of statewide systems at the local government level. Local government agencies end up entrained with state government's backward looking time-horizon. These interactions continuously take place at varying paces and rhythms as they are approached by each's different foresight horizons. How government's customers are perceived may be out of touch with their contemporary view of themselves leading to similar out-of-step effects. Each time-ecology element may be in phase or out of phase with others and demonstrate little to high levels of turbulence.

IV. Provisional Specifications For A Simulation Of The Impact Of Public Policy Interventions On An Industry Cluster Time-Ecology

An adequate simulation of the timing effects of public policy interventions might include the following elements:[11]

- Identifies relevant co-evolving structures for both government and an industry or other regulated or policy area, including the level and scale of regulatory connections between them.

- Identifies how each structure and connector is spatially and temporally extended. For example, governments have specific jurisdictional boundaries with associated enforcement schedules; industries may be globally networked and work at "zero-time."

- Situates each element and connector in their temporal flow by identifying their temporal signature, their characteristic way of proceeding out of the past and into the future, and their relevant foresight horizon.

- Situates government and the policy sector on their respective adaptive landscapes and identifies dynamic linkages between landscapes, if appropriate.

- Specifies the life-cycle stages, and growth rates for government and the policy-area organizations, and for their connectors (including their boundaries). Translates these and the above characteristics into a respective population of interacting, learning, and adaptive agents on linked adaptive landscapes.

- Specifies the level and scale of government interventions as a heterochrony; that is, as the simultaneous pacing and rhythm of varying flows of multiple information, resource, and energy sources through various connectors to the differing levels and scales of a government agency and policy area's adaptive agents. Depending on the capacity of the receiving agent, such government heterochronic inputs either slows down, speeds up or leaves development and/or growth rates unchanged. A different set of heterochronic inputs influences the government agency development as it co-evolves.

- Incorporates policy adaptive mechanisms (genetic algorithms for example) to evolve the policy. Key factors would include political priorities, business competition (markets, technology, etc), resources, information, networks, time-ecology, temporal signature or foresight horizon change, all of which influence the agents as they co-evolve on their respective landscapes.

- Permits the visualization of the pacing and rhythm of each flow, their convergence, the growth and development of agents, their co-evolution and the emergence of new agents and structures. Tracks changes in their internal structures.

- Permits experimentation to determine if the policy intervention (resources or regulatory) is at the appropriate level and scale, and has the appropriate pace relative to the desired outcome.

- Reveals the cumulative impact across multiple scales, in interaction with other government interventions into the future. For example, attention could be given to how this timing affects each's stage of development, size, and growth relative to the values of these characteristics prior to the intervention. [12]

- Traces the relative competitive advantage of a business, industry-cluster, region, and the state, or a similar outcome measure for another policy area.

- Provides quantitative data, preferably as cost/benefits on business, the environment, quality of life, and other relevant factors.

- Provides qualitative data that reveals patterns and changing relationships over time.

VI. Acknowledgement

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[1] Koehler, G. (2000)."What Does The Increase In "Business Velocity" Have To Do With Developing California State Foreign Trade Policy?", a speech and paper presented to the Waltern H. Shorenstein Forum Asia/Pacific Research Center, Stanford University June 13, 2000; and Koehler, G. (2001). "Ways to Help The Community Colleges Economic Development Program Be More Adaptive", a presentation

prepared for the Committee on Economic Development and Vocational Education Board of Governors of the California Community Colleges March 28, 2001.

[2] See: Lawrence Dodd, "A Theory of Congressional cycles: Solving the Puzzle of Change," in Gerald Wright, Leroy Rieselbach, and Lawrence Dodd (1986). Congress and Policy Change. New York: Agathon Press. 3-44; Robert Erikson and Gerald Wright (1981). Voters, Candidates, and Issues in Congressional Elections, in Lawrence Dodd, and Bruce Oppenheimer (1981). Congress Reconsidered. Washington, D.C.: CQ Press. 87-107; Paul Light (1982). The President's Agenda. Baltimore, Md.: Johns Hopkins University Press; Richard Neustadt and Ernest May (1986). Thinking in Time. New York: Free Press. T. Alexander Smith (1988). Time and Public Policy. Knoxville: University of Tennessee Press, 1988; and Arthur Schlesinger, (1986). The Cycles of American History. Boston: Houghton Mifflin Co.

[3] See: Burdett Loomis (1994). Time, Politics, and Policies: A Legislative Year. Lawrence: University Press of Kansas: Bruce Oppenheimer (1985). "Changing Time Constraints on Congress: Historical Perspective on the Use of Cloture," and Lawrence Dodd and Bruce Openheimer (1985). "The House in Transition: Partisanship and Opposition," in Lawrence Dodd and Bruce Oppenheimer (eds.) (1985). Congress Reconsidered (3rd Ed.). Washington, D.C.: CQ Press; Kenneth Shepsle and Barry Weingast (1988). The Institutional Foundations of Committee Power," American Political Science Review, Vol. 81 (March 1987), pp 85-104. And Stephen Smith, "An Essay on Sequence, Position, Goals, and Committee Power," Legislative Studies Quarterly, Vol. 13 (May 1988), pp. 151-176;). John W. Kingdon, Agendas, Alternatives, and Public Choices. Boston: Little, Brown, 1984.

[4] Simmons, Charlene, and Alicia Bugarin (1999). Building a Skilled State Information Technology Workforce. Sacramento, CA: California Research Bureau, CRB-99-007.

[5] Kummerer, Klaus (1996). The Ecological Impact of Time. Time and Society, Vol. 5, no. 2. For a more philosophical approach see: De Landa, Manuel (1997). A Thousand Years of Nonlinear History. New York: Swerve.

[6] Koehler, Gus (1999). "Political Regulation of Time-Ecologies," a paper presented at the Ninth Annual Society for Chaos Theory in Psychology and the Life Sciences, June 23-26, 1999, University of California, Berkeley. Being revised for reconsideration in Nonlinear Dynamics, Psychology and the Life Science.

[7] Koehler, Gus (2000). "Understanding the Complex Timing Effects of Public Policy Interventions in Industry Clusters," requested contribution to Nonlinear Dynamics, Psychology, and the Life Sciences, November 2000. Under editorial consideration.

[8] Jone, Victoria (2000). Time Structures. Sacramento, CA: Time Structures.

[9] Lowi, Theodor (1972). "Four Systems of Policy, Politics, and Choice," Public Administration Review, July/August 1972.

[10] Simmons, Charlene, and Alicia Bugarin (1999). Building a Skilled State Information Technology Workforce. Sacramento, CA: California Research Bureau, CRB-99-007.

[11] This conditions have been worked in detail as a possible guide for developing a simulation of this type. See: Koehler, G. (2001). A Framework for Visualizing the Chroncomplexity (Draft). Sacramento, CA: California Research Bureau, and Time Structures (916-564-8683).
 of Political Regulation of Time-Ecologies

[12] Gould, Stephen (1977). Ontogeny and Phylogeny. Cambridge, Mass.: Belknap Press of Harvard Press. McKinney, M.L. and K. J. McNamara (1990). Heterochrony: The Evolution of Ontogeny. New York: Plenum Press.