

## **PARTICIPATIVE MODELING AND PUBLIC POLICY: THE CASE OF AMERICAN WELFARE REFORM**

**Aldo A. Zagonel**

**David F. Andersen**

**Robert Johnson**

**John Rohrbaugh**

**George P. Richardson**

Approaches to systems thinking, strategic planning, decision analysis, decision support, and decision conferencing are increasingly coming to rely upon the practice of building models directly with management teams and decision-making groups (Zagonel 2002). The objectives of these researchers and practitioners are manifold, ranging from improving group decision-making processes to enhancing group, team and organizational effectiveness and productivity (Andersen *et al.* 1997).

The importance of involving the clients in the process of model building has been recognized early on in the field of system dynamics (Forrester 1961, Roberts 1978). Stenberg (1980) first introduced the practice of drawing upon a reference group, as a “mini-universe of the part of the real world under study” (p. 303). A recent development involves more active client-group engagement especially but not exclusively in the conceptual phase of model building, in the form of group meetings or conferences. This line of research and practice has been termed group model building (Richardson *et al.* 1992, Vennix *et al.* 1997). Vennix (1996) characterizes it as a kind of group decision support for helping teams tackle strategic problems. Gradually, a unified body of knowledge containing methodological guidelines to develop group-modeling procedures is flourishing (Richardson and Andersen 1995, Vennix 1996, Andersen and Richardson 1997). As they are experimented with, these procedures are also being evaluated (Rouwette *et al.* 2002).

This participative approach is based upon system dynamics (SD), a multi-phased iterative modeling method aimed at problem solving. The lens of SD is focused upon endogenous feedback-rich insights of system causes and effects (Sterman, 2000). However, deeply involving a group in model construction and use required theoretical and applied input from fields such as sociology, social psychology, and small-group research (Vennix, 1999). In our work, this influence has been experienced through decision conferencing (Rohrbaugh, 2000). In the latter, experts in tools and procedures facilitate groups through cognitive and analytical processes aimed at arriving at consensual decisions.

Group model building (GMB) is particularly useful to address “messy problems” involving multiple stakeholders in situations of interdependency –each stakeholder contributing with a partial view of the system but being affected by the system as a whole. Messy problems occur when the issues are elusive and the policies under consideration and their likely outcomes if implemented uncertain (Ackoff, 1974).

Thus, this approach to SD modeling is especially suitable to examine public policy issues, because those are by definition characterized by differences in views or responsibilities of multiple often diverging stakeholders. In this paper, we report how and to what effect this participative modeling approach was used to tackle a public policy problem. The emphasis of this applied work was upon creating a model that the participants could use as a laboratory, to experiment with their differing assumptions and strategies. Therefore, we used the model as the context to frame and address “what if” questions.

Speculating on future policy impacts is intrinsically hard because traditional tools for policy analysis are data based and data about the future is distinctly lacking. Consequently, “what if” analyses are grounded in the data of “what is” but also contain expert judgments concerning the structure and behavior of the systems that they address. This article illustrates the use of simulation models constructed using GMB techniques to support “what if” analyses by management teams. This approach is a specialized form of decision support systems enabling groups to interact in facilitated face-to-face structured activities, resulting in the creation of a formal simulation model of a specific policy system. The aim is to combine analysis with facilitation to promote organizational learning. This research involved a partnership between state and local departments of social services to assist policy makers to respond to changes imposed by American welfare reform. Here we summarize who was involved, the analytical approach used, and the purposes served.<sup>1</sup> But, first, we provide a brief overview of what motivated this group work.

## **AMERICAN WELFARE REFORM**

The history of social welfare in the United States has come full circle. In 1935 amid the Great Depression, the federal government assumed greater responsibility for the poorest members of society through the enactment of the Social Security Act and the implementation of a federally funded program called Aid to Families with Dependent Children (AFDC). Recently, there was devolution of this task to state and local governments (Thompson 1996). This devolution occurred in the form of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), enacted in 1996 and gradually implemented in five years between 1997 and 2002. In brief, PRWORA ended a federal entitlement and limited benefits to a cumulative five-year period per family –after which the family loses eligibility for the federally funded Temporary Assistance to Needy Families (TANF) program, which replaced AFDC. The law also switched the funding mechanism from matching to block grants, thereby capping federal spending while providing states and localities with more managerial flexibility.

---

<sup>1</sup> For a comprehensive technical report and analysis see Zagonel, A.A. (2003). Using group model building to inform welfare reform policy making in New York State: a critical look. Proceedings of the 2003 International Conference of the System Dynamics Society. New York City (July 20-24).

The shift in focus, from monetary assistance (through AFDC) to services designed to promote work and avoid dependency (through TANF), actually had been initiated earlier through the Family Support Act (FSA) of 1988; FSA was designed to promote welfare-to-work initiatives (Lurie 1997). While this transitional experience contributed both to understanding the new mode of operation and to initial restructuring of services and programs, the full impact of the newest legislation was to unfold only as states and municipalities made the effort to fully implement it. Thus, enactment of PRWORA was accompanied by criticism that its measures were too harsh on the poor, or simply not thought out carefully enough (Edelman 1997).

Of particular concern to our client groups was the loss of eligibility to assistance, resulting in large numbers of families without access to help. Thus, the modeling exercises focused on examining how many families would lose eligibility, under what conditions, and what factors, initiatives or strategies could potentially mitigate these numbers.

## **USING MODELING TO FRAME QUESTIONS**

Welfare reform posed serious challenges to local governments. Front-line policy makers were confronted with many “what if” and “what when” questions. These questions were of two forms. “What might happen if we make such and such a *policy* change?” For example, what happens if more emphasis is placed on assessment and monitoring? Or, what if more investments are made in job training? Moreover, “what might happen given a *scenario* change?” For example, what happens if (or when) the economy turns for the worse?

This article describes a process and a tool through which a group confronted with these sorts of questions comes to an agreement about the questions themselves and the elements of the policy system relevant to address them. In a nutshell, these elements are built into a simulation model, parameterized against administrative data and group judgments, and calibrated and tested against cross-sectional and time-series data. The model is formulated with the objective of addressing the questions, which are answered by looking at simulated plots of variables against time and reflecting upon the system’s structure.

### **The *process* of model building**

This intervention was unusual because we worked with three groups separately, but pursued an integrated model. We began with the Temporary Assistance to Needy Families (TANF) program in Cortland, a rural county in central New York. We moved to the safety-net<sup>2</sup> programs in Dutchess, a mid-sized city in the Hudson valley. Finally,

---

<sup>2</sup> In New York State, safety-net programs serve clients ineligible for TANF and are likely to become the future point for those who lose eligibility as a result of time limits.

we refined a joined model in Nassau, a large and demographically complex borough adjacent to New York City. This section describes a typical intervention –i.e., a single iteration of the modeling process.

In general, a simulation model can be created in four full-day group meetings. The first meeting is devoted to *problem definition*. The second and third meetings are used for *model elicitation*. The fourth meeting is for *model presentation*, use and evaluation. Helping the clients plan and implement the next steps following model development is a formal part of the design. Additional meetings for model refinement, or use for specific purposes are commonly scheduled.<sup>3</sup>

It normally takes three or four months to build the model. Full-day group meetings take place in conference rooms away from work and outfitted with boards and charts for sketching, and computer and projection equipment for presenting. The client team consists of a small group precisely selected by a *gatekeeper*. The technique relies on having both policy makers and operating managers in the room to specify the relationships that will be in the model. Moreover, key stakeholders to the effort determine the knowledge base, shape the boundary of the model, and secure implementation of the group’s decisions (Morecroft, 1994).

A modeling team taking on four roles (*facilitator, reflector, process coach and recorder*) conducts the meetings, facilitating the group’s discussions, providing technical and procedural support, sketching model structure and taking minutes (Richardson and Andersen, 1995). The system’s picture is drawn using icons later transcribed into graphical software. The model is completed between meetings. Its construction relies upon scouring administrative data to estimate model parameters. Group meetings begin with an overview of previous agreements and a progress report of between-meeting work for discussion and approval. The modeling team works toward rapid prototyping of the simulation model. When specific data does not exist, group oriented exercises use expert judgment to estimate parameters and effects. Often, the modeling exercise identifies the need for data collection previously undetected.

A client group motivated to reach consensus can move quickly toward a shared vision of the policy system when meetings are skillfully structured and facilitated (Andersen and Richardson, 1997). The final model reflects a negotiated, consensual view of the system –akin to a “shared mental model” (Senge, 1990)– “validated” through multiple means.<sup>4</sup>

---

<sup>3</sup> This intervention had additional meetings for *model parameterization* and calibration, presentation of insights in *community forums*, and *resource allocation conferences*.

<sup>4</sup> Model validation in system dynamics is understood as a *confidence building* process through which models may be regarded as useful, illuminating or inspiring confidence, based upon tests done aimed at uncovering and fixing flaws that matter relative to purpose (Sterman, 2000). In this intervention, model refinement was based upon several tests of logical coherence, and structural and behavioral correspondence. The structure of the model emerged from the group process. The parameters were based on administrative data. When data was not available, the experts in the client groups made independent estimates of parameters and functions, and these were compared and analyzed for consistency and convergence. Cross-sectional model output was compared directly to data for several important variables.

From beginning to end, the project actively reached out to the people who were implementing welfare reform in New York State by engaging them as the primary source of expertise to design a simplified yet comprehensive view of the welfare system. Actually, these welfare managers and executives were not just implementing a static version of reform. Rather, they were making the reform happen. This was recognized openly by the New York State Commissioner of Social Services (Rohrbaugh & Johnson 1998):

With welfare reform, everyone’s role is changing. For us at the state level, we have to stay out of the business of dictating how things get done at the local level. The modeling project is a good example of this kind of positive change in state/local relations and cross-agency teamwork. In the past, we probably would have told counties –in great detail and with incredible specificity– how we wanted them to implement welfare reform. Now we are making every effort to provide sophisticated, yet practical tools such as the welfare reform simulator, that local communities can use to think through policy implementation and arrive at their own solutions. I’m convinced that flexibility will be a key to successful welfare reform.

### **The model as a *tool* for experimentation**

An essential product of these interventions is a running model used as a “management flight simulator”. This term is a direct analogue to flight simulators that are used to train pilots. The notion is that policy managers can gain experience “flying” new policy systems without fear of disastrous consequences, threat to client well being, and career endangering cost overruns. This experimentation leads to team learning and improved decision-making, based upon identification of leverage points and improved ways to manage the system.

The model developed for this particular intervention is too complex and detailed to be fully examined in this short article. Figure 1 is a highly simplified view of the TANF sector to show some key elements and to help illustrate a couple of “what if” simulations. (For the sake of saving space, this figure is overlaid with a scenario simulation discussed shortly.) This figure depicts how resources affect the rates of client-flow in this system. In the “front-end”, *prevention* resources reduce the inflow of families from the mainstream economy. The “stock” of *families at risk* represents an accumulation of eligible families with problems such as teen-age pregnancy, poverty and/or loss of employment.

---

Behavioral reproduction tests comparing simulation runs and actual time-series produced a “good” fit for a 14-year period, demonstrating that the model was capable of closely tracking historical caseload. The model was tested for extreme conditions to assure that it behaved sensibly over a wide range of policy assumptions. Every simulation done in the context of the group was followed by debriefing and story telling aimed at diagnosing and explaining behavioral modes, tracing the behaviors back to the structure of the model (and of the real system).

“Participative Modeling and Public Policy: The Case of American Welfare Reform”

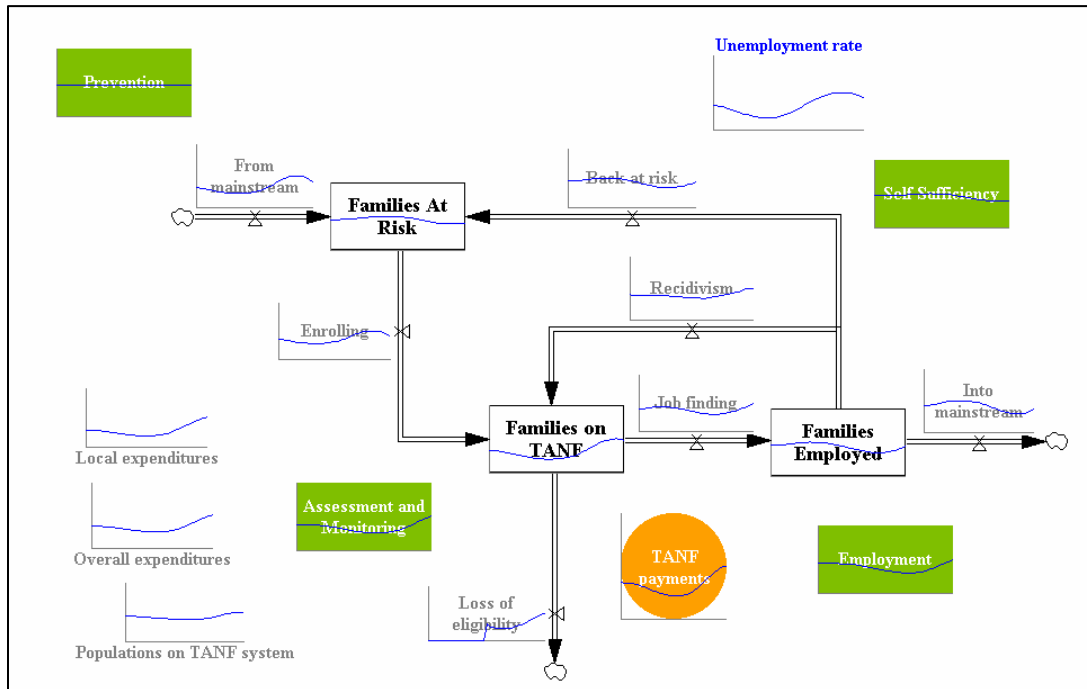


Figure 1. Highly simplified view of the TANF system (overlaid with simulation of scenario)

In the “middle”, *assessment and monitoring* conducts a “triage” process of enrolling families into programs and monitors their progress as they strive to transition into work. *Families on TANF* receive payments (as well as services) and while they stay in this stock an internal clock keeps track of their time used up. *Employment* services, in turn, provide clients with training, child-care and transportation, to “pump” recipients from the caseload into paid jobs, where they are represented in the stock of *families employed*.

Often times these jobs cannot be retained and former recipients return into the caseload via a direct process of recidivism (or indirectly via falling back at risk). Thus, in the “back-end” are services which promote *self sufficiency* and help families maintain the jobs they obtained, move on to better jobs and, eventually, transition into the mainstream economy. For illustration, three important cost variables are shown: *TANF payments* to families on the caseload, *overall expenditures* including payments and services, and the share of those expenditures paid with local dollars (*local expenditures*).<sup>5</sup>

As summarized by one of County Commissioners (Rogers *et al.* 1997):

The model provokes the participants to examine the impact of changes in the administration of welfare programs as having community-wide

<sup>5</sup> The full welfare model depicts also processes such as diversion and sanctioning, separates TANF recipients into high and low need groups, accounts for the safety-net system, computes the costs of diversion, safety-net and emergency services, and keeps track of expenditures according to their nature (program vs. administrative) and sources (federal, state and local).

consequences. Traditionally, changes in this department’s budgeting have been viewed as being an isolated problem, which allowed a “business as usual” response for providers of services... The development process involved promotes the creation of a grass roots plan... The model provides a structure for discussions for community-wide strategy sessions by identifying validated high impact points in the system. Welfare reform partners are able to create community-acceptable goals... Most importantly, the simulations vividly expose the system of welfare by portraying the community-wide opportunities for investment and risk.

## **ADDRESSING “WHAT IF” QUESTIONS WITH THE MODEL**

The simulator can be used to explore a range of policy options and scenario changes because it “remembers” the structural and parametric assumptions that emerged from the modeling work. As illustrated in Figure 1, in the simulation of an economic scenario, the behavior of each of the model’s variables is tracked over time. In this case, the experimental unemployment rate contains an oscillatory behavior, leading to corresponding oscillations in most of the variables of the model. While some of the variables behave synchronously with the unemployment rate (such as the stock of families on TANF, and the inflow from the mainstream economy), others respond asynchronously due to other assumptions and relationships embedded in the model (such as the stock of families employed, loss of eligibility, and the outflow back into the mainstream economy). All of the while, the resources are being adjusted and the costs are being computed. The ability of the model to integrate all of the assumptions and project over time their consequences leads to counterintuitive insights resulting from interactions and feedback effects.

Normally, policy and scenario experiments are conducted in comparison with a base run simulation representing the future pattern of behavior resulting from basic assumptions – a sort of “control group”. Changes in input assumptions representing alternative policies and scenarios –in the form of deviations from basic assumptions– are simulated and the results are compared. Thus, alternative policies and scenarios –representing alternative futures– can be tested and evaluated. These exercises result in team learning and consensus building. We will illustrate with an example.

### **Welfare-to-work v. community-wide initiatives**

Here we contrast two policies. The Base run shows the model’s projection of what would happen to the county’s welfare system if no policy changes were made and if there were no scenario changes (especially about changes in unemployment).<sup>6</sup> The first policy is

---

<sup>6</sup> The Base assumption about unemployment is that the economy was at the exact unemployment rate that would cause no growth, but also no decline. (The modeling team “backwards computed” this figure as part of the model calibration phase.) This abstraction is intended to “hold constant” the very large effects of

labeled “Middle” and emphasizes *assessment and monitoring*, and *employment services*. The second policy mix is labeled “Edges” and emphasizes *prevention* and *self-sufficiency*. While the former has been the motto of reform campaign in social services, commonly referred to as the welfare-to-work approach, the latter involves larger partnerships in the community (with education, labor, and private charities). The Middle policy captures the renewed mission of social services units, while the Edges policy involves investments clearly outside the boundary of social services and hence more controversial. These policy runs highlight some of the sharp choices that managers were facing without the confounding influence of simultaneous swings in unemployment or other scenarios at work in their environment.

Figure 2 compares these policies in terms of the TANF caseload. The simulations suggest that both initiatives fare better than the Base run. The Base run shows that the 1996 welfare reform (without any significant new resource investments) starts to move clients off the welfare rolls into employment. But, significant new investment in the Middle or Edges accelerates this beneficial trend. While the Middle policy produces better short-term results, the Edges policy has better long-term effects.

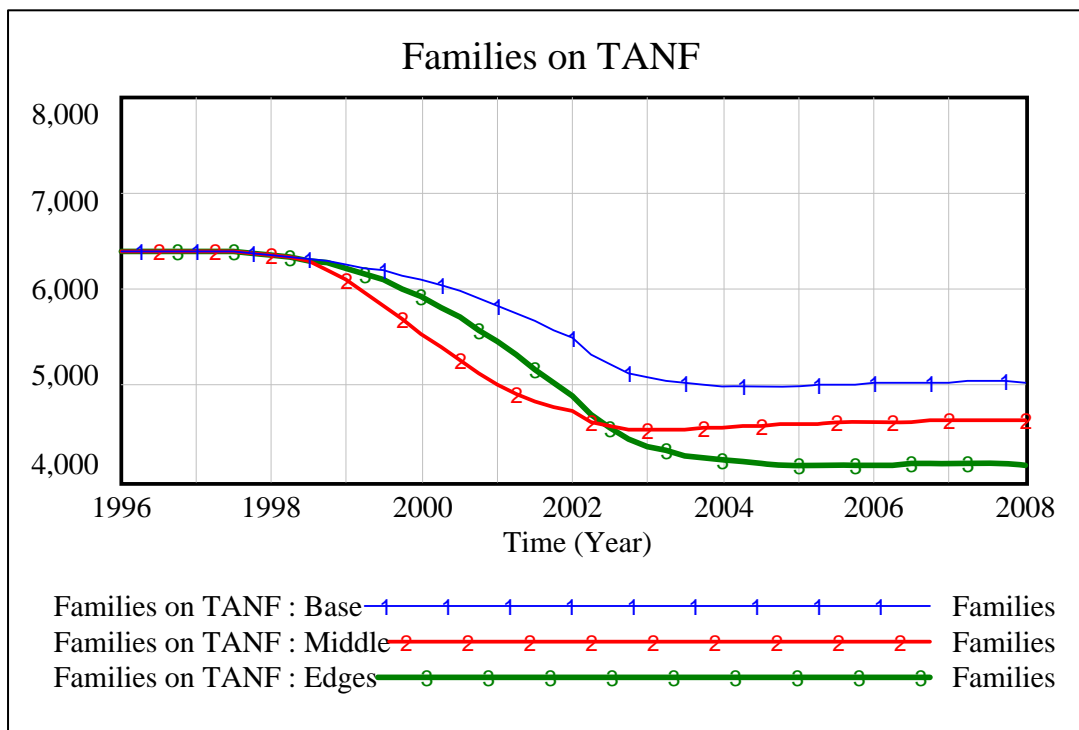


Figure 2. Contrasting policies (Base vs. Middle vs. Edges investment packages)

unemployment on the caseload so that the runs may show “pure” effects of policy changes. The Base run already includes the basic features of welfare reform, such as time limits.

When we trace these behaviors back to the assumptions embedded in the model, we find structural explanations for this. The Edges policy reduces recidivism. Since enrollment into TANF is equal to recipients coming from families at risk plus recidivism, this reduction decreases the caseload. At the same time, more employed families are leaving the system into the mainstream. In other words, the system is being “deflated”, and the ratio of resources relative to clients is being enriched. This constitutes a *reinforcing dynamic* through which initial success leads to greater success. On the other hand, the Middle policy has a “swamping” effect. As recipients are “pumped” from the caseload into the stock of families employed, they overwhelm the existing self-sufficiency capacity. This results in increases in recidivism and represents a *balancing dynamic* inherent in the system.

Here we looked only at the caseload. Unfortunately, the “best” strategy is heavily dependent upon what one seeks to accomplish, and how one measures success in this system. Different policy makers looking at the same set of simulations might make different choices concerning which policy future is best and why (Gardiner and Ford, 1980). One manager may prefer to reduce recidivism, another to simply get more TANF employees into employed positions, and yet another may choose to save the local taxpayers as many dollars as possible. However, the simulation model provides a “level playing field” for evaluating the “what if” implications of different policies, always using precisely the same agreed upon set of assumptions and displaying *all* of the “relevant” information.

Of course, these inferences are only as good as the model upon which they are based. As the old saying goes “Garbage in equals garbage out”. Thus, it is crucial to strike the proper balance in using the model to facilitate the process of building group consensus, and to depict accurately and reliably the relationships and the data in the policy environment external to the group (Zagonel, 2002).

### **Anecdotal evaluation of the intervention**

Although we did not conduct a formal evaluation of the intervention, we gather that our clients had a very favorable reaction to the whole experience, as captured in the following synopses by key workgroup members, published both in scholarly and governmental journals:

The group modeling sessions provided an opportunity for representatives from several agencies within the community to come together in one setting to plan for welfare reform. As discussions regarding the complexity of social services programs took place, the value of computer support and modeling was amply recognized. The model and the simulations permitted detailed exploration of the interactions between different scenarios and alternative welfare reform policies. Finally, the experience to work with the modeling team –in the process of model conceptualization, formulation and calibration, for the purpose of

## “Participative Modeling and Public Policy: The Case of American Welfare Reform”

examining the impact of changes in the administration of welfare programs –was both challenging and rewarding. (Allers *et al.* 1998)

We were hoping that, with the development of the model, communities could identify the high-leverage points in their system and shift their strategies accordingly (Rohrbaugh & Johnson 1998).

The flight simulator makes the relationships between government and non-government agencies such as charities visible, thereby helping to make the entire welfare system easier to understand (*Empire State Report* 1998).

The simulator makes it easy to pose a large number of “what if” questions about alternative strategies, changes in the economic and social environment and alternative approaches to funding services (Rohrbaugh & Johnson 1998).

## CONCLUSION

The PRWORA in 1996 shifted decision-making power closer to on-site administrative action, by increasing state and local flexibility and discretion in designing and running programs. States now can choose to transfer a portion of federal dollars to child care or other social services deemed important to accomplish the legislative intent of the Act; they can reduce monetary assistance in favor of other means of support; they can establish governmental and non-governmental partnerships to administer programs; and they can promote innovative means to reduce caseloads, such as an increased emphasis on child support enforcement services (Lurie 1997).

The welfare models were used extensively with the client groups in a thorough search for management strategies that would improve the performance of the system at the local level. Managers were allowed to experiment with their initially preferred strategies, investing in alternative mixes of welfare services (prevention, assessment and monitoring, diversion, employment services, child support, and self-sufficiency promotion). This process of strategy selection, implementation and evaluation using the models as a laboratory proved to be an excellent means of surfacing and testing the assumptions of members of the management teams. It also provided an opportunity for a highly useful exchange of ideas among team members, as well as substantial learning about implicit mechanisms of the welfare system.

The models were built for the purpose of helping management teams go through a difficult conversation regarding a topic filled with uncertainty. They needed some facilitation assistance to engage in this conversation, including technology to help “remember” their assumptions, integrate impacts on client flows, and deal with feedback-rich dynamic complexity. This intervention was successful in producing a consensual

## “Participative Modeling and Public Policy: The Case of American Welfare Reform”

view of the welfare system and of welfare reform among the participants. The structure of the model and the behavioral patterns that it produced –base, policy and scenario runs– were found reasonable and plausible, even to audiences who had not engaged directly in the model-building process.

The model also proved useful for addressing what-if questions. Because the model was built based upon causal relationships elicited from the participants, it allowed a very insightful form of pattern analysis: “if we do so and so, then we expect so and so to happen...” This kind of “what if” policy-modeling, merging hard data with expert judgment, are best compared to intuitive judgments that managers and policy makers are often forced to make, rather than to the data driven social scientific estimates that emerge from much policy analytic work. Still, they based upon rigorous methods and they present strengths and opportunities that complement well traditional research.

Models can be quickly assembled that are “aligned” with the mental models of the management team responsible for policy implementation because these teams are intimately involved in model construction. The simulator makes it easy to pose a large number of “what if” questions about alternative strategies, changes in the economic and social environment and alternative approaches to funding services. Various policy and scenario changes can be tested without risks of cost overruns or adverse impacts on the public since any possible system “crashes” would only be simulated ones.

The output from the simulations makes the different outcomes vivid, and directs the conversation to how different members of the policy team evaluate those outcomes differently. Multiple future-possible simulated worlds can be discussed in an effort to test assumptions, identify leverage points, contrast ideas for system improvement, assess tradeoffs, and promote learning.

Learning and understanding are emergent. By this we mean that the group’s understanding of policy dynamics grows through the *process* of working on and with the model. The simulation model should be viewed as a tool to support learning; not a tool that can tell the truth about what will ultimately happen. Still, the models can be systematically tested against a wide array of existing data sets and non-numeric sources of information about system structure to build confidence in the model and its conclusions.<sup>7</sup>

The use of the model to examine what-if questions related to management policies revealed a wealth of insights with respect to issues that are absolutely necessary to resolve if system performance were to be improved. For example, key reinforcing and balancing feedback loops indicate that a powerful policy is the promotion of self-

---

<sup>7</sup> During numerous presentations and workshops to expert audiences, including outside participants, the welfare reform model structure and the simulated behaviors depicted were found reasonable and plausible. However, the process of building confidence is never done in any ultimate sense. No model exactly replicates reality, and all models are in some sense “wrong”. At some point, the process of policy design must move forward and managers must make their best guesses of what will happen and additional tests may not be practical.

## “Participative Modeling and Public Policy: The Case of American Welfare Reform”

sufficiency through services that assist individuals in gaining and, especially, maintaining employment. While it is not best with respect to every performance criterion, investments in employment services deflate the welfare system and avoid cycling. In the long term, this strategy is likely to produce many good outcomes for the welfare of the recipients themselves and for the welfare of society at large.

The model can be used to share insights about the system with a wide audience because its structural assumptions can be made clear and it produces over time simulations of key variables and performance indicators within the system. The exercise also can help identify gaps in data collection, and the model can help guide the design of information systems.

Most importantly, however, GMB made apparent that success or failure in welfare reform lies in the extent to which partnerships across a large and diverse number of community organizations develop, not strictly in the isolated performance of county departments of social services. Thus, what is needed to succeed is a concerted countywide response involving multiple community organizations, both public and private, in a broad leadership coalition, who make shared decisions about the allocation of county resources.

In conclusion, this policy analytic approach contrasts in interesting ways with approaches recently commended in Gueron (2003). While based in social scientific research, it is at the same time comparable to the rough-and-ready intuitive analyses emerging from smoke filled back rooms –a key source of many practical policy choices. We believe this approach is useful because no matter how extensive the analytical effort, it is still best when clients and audiences understand clearly and thoroughly the causal links in the system and how behavior can be traced to causal structure. No amount of directing clients to the right answers will ever replace the primary value of their understanding what happens to system behavior if a change in system structure or parameters is made, tracing back that solid explanation to the system structure itself.

## REFERENCES

- Ackoff, R.A. (1974). *Redesigning the Future: a Systems Approach to Societal Problems*. New York: Wiley.
- Allers R, R Johnson, DF Andersen, TP Lee, GP Richardson, J Rohrbaugh and AA Zagonel. 1998. Group model building to support welfare reform, part II: Dutchess County. *Proceedings of the 16<sup>th</sup> International Conference of the System Dynamics Society*. Québec, Canada (July 20-23).
- Andersen, D.F. and G.P. Richardson (1997). Scripts for group model building. *System Dynamics Review* 13 (2): 107-129.

“Participative Modeling and Public Policy: The Case of American Welfare Reform”

- Andersen DF, GP Richardson and JAM Vennix. 1997. Group model building: Adding more science to the craft. *System Dynamics Review* 13 (2): 187-201.
- Edelman P. 1997. The worst thing Bill Clinton has done. *The Atlantic Monthly* (March): 43-58.
- Empire State Report*. January 1998. Understanding Welfare: 17.
- Forrester JW. 1961. *Industrial Dynamics*. Portland, Oregon: Productivity Press.
- Gardiner, P.C. and A. Ford (1980). Which policy run is best, and who says so? In A.A. Legasto Jr., J.W. Forrester and J.M. Lyneis (Eds.). *System Dynamics*. TIMS Studies in the Management Sciences 14: 241-257. New York: North-Holland.
- Gueron, J.M. (2003). Presidential address – Fostering research excellence and impacting policy and practice: the welfare reform story. *Journal of Policy Analysis and Management* 22 (2): 163-174.
- Lurie I. 1997. Temporary Assistance for Needy Families: A green light for the states. *The Journal of Federalism* 27 (2): 73-87.
- Morecroft, J.D.W. (1994). Executive knowledge, models, and learning. In J.D.W. Morecroft and J.D. Sterman (eds.). *Modeling for Learning Organizations*: 29-49. Portland, Oregon: Productivity Press.
- Richardson, G.P. and D.F. Andersen (1995). Teamwork in group model building. *System Dynamics Review* 11 (2): 113-137.
- Richardson GP, DF Andersen, J Rohrbaugh and W Steinhurst. 1992. Group model building. *Proceedings of the 1992 International Conference of the System Dynamics Society*. Utrecht, The Netherlands: 595-604.
- Roberts EB (ed.). 1978. *Managerial Applications of System Dynamics*. Cambridge, MA: The MIT Press.
- Rogers J, R Johnson, DF Andersen, J Rohrbaugh, GP Richardson, TP Lee, and AA Zagonel. 1997. Group model building to support welfare reform in Cortland County. In *Proceedings of the 15<sup>th</sup> International Conference of the System Dynamics Society*. Istanbul, Turkey (August 19-22): 605-612.
- Rohrbaugh, J. (2000). The use of system dynamics in decision conferencing: implementing welfare reform in New York State. In G. David Garson (ed.). *Handbook of Public Information Systems*: 521-533. New York: Marcel Dekker.
- Rohrbaugh J and R Johnson. 1998. Welfare reform flies in New York. *Government Technology* (June): 58.

“Participative Modeling and Public Policy: The Case of American Welfare Reform”

- Rouwette EAJA, JAM Vennix and T van Mullekom. 2002. Group model-building effectiveness: A review of assessment studies. *System Dynamics Review* 18 (1): 5-45.
- Senge, P.M. (1990). *The fifth discipline: the art and practice of the learning organization*. New York: Doubleday.
- Stenberg L. 1980. A modeling procedure for public policy. In J Randers (ed.). *Elements of the System Dynamics Method*. Cambridge, MA: Productivity Press: 292-312.
- Sterman, J.D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston, MA: The McGraw-Hill Companies, Inc.
- Thompson FJ. 1996. Devolution and the states: Challenges for public management. Paper presented at the Annual Meeting of the Association for Public Policy Analysis and Management. Pittsburgh, Pennsylvania (October 31 - November 2).
- Vennix JAM. 1996. *Group Model Building: Facilitating Team Learning Using System Dynamics*. London: John Wiley & Sons.
- Vennix, J.M.A. (1999). *Group model-building: tackling messy problems*. *System Dynamics Review* 15 (4): 379-401.
- Vennix JMA, DF Andersen and GP Richardson (eds.). 1997. *Group Model Building*. *System Dynamics Review* 13 (2): 103-106.
- Zagonel, A.A. (2002). Model conceptualization in group model building: a review of the literature exploring the tension between representing reality and negotiating a social order. *Proceedings of the 2002 International Conference of the System Dynamics Society*. Palermo, Italy (July 28–August 1).