

THE RIGHTWORKFORCE™ APPROACH MODELING FUTURE WORKFORCES THROUGH A HETEROGENEOUS AGENT SIMULATION APPROACH

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Significant Limitations of Current Products and Services

The dynamic, integrated RightWorkForce™ challenge. The greatest single challenge that HR managers face in becoming strategic business partners is to appreciate the “powerful connections” and “deadly combinations” caused over time – as intended and unintended consequences – by feedback structures. (Source: Becker et al., “HR as a source of shareholder value” *HR Management journal*). Research has shown that currently-available HRIS applications and analysis packages do not address this challenge well.

Complex feedback effects, operating over time within firms, also have presented a difficult challenge for their human resources advisors. This strategic HR consulting problem is one of integrating multiple-level, longitudinal, workforce-wide data in rendering effective advice. Advisors continue to probe for approaches that will help them to respond comprehensively to a client’s ultimate strategic HR question: “What set of integrated recommendations does the consultant recommend, to help ensure that the client maintains the right workforce at the right times and places, for today’s operating plan and tomorrow’s strategic plan?”

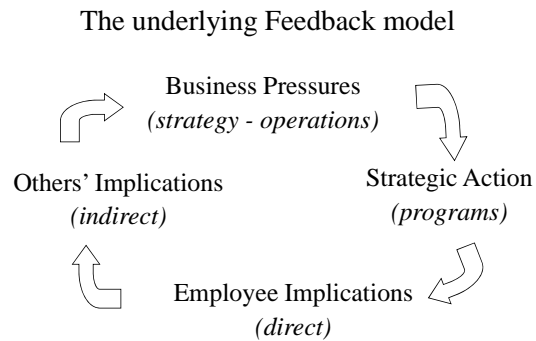
Consultants’ specialist approaches (in their own organizational structures, and in the services they provide) predictably have failed to provide integrated responses that take interaction effects and longitudinal developments into account. In our personal experience, confirmed through “insider” interviews, global HR consulting firms are very challenged to offer advice integrated across human resources domains and across the operational and strategic concerns of the client. Moreover, the challenge is not limited to modeling unintended consequences; any dynamic projection of the workforce that crosses HR “silos”, incorporates operations data, or attempts to reflect individual decisions has been similarly problematic. Our approach is novel in scholarly research to date; we believe it is entirely unexploited in today’s consulting practice or software applications relating to HR concerns.

In case studies at several firms, we studied delayed interaction effects of proposed reductions in total rewards offerings. For example, reductions in future pension accruals, early retirement subsidies, or retiree medical plan eligibility or generosity, each could retard the pace of older workers’ retirements. Such delays probably would *directly* increase a firm’s overall expense for direct compensation, section 401(k) matching contributions, and active retiree medical coverage. They might also lead *indirectly* to increased turnover in the ranks of junior employees; inability to maintain the necessary mix over time of employee knowledge, skills and attitudes (“KSAs”); decline in the pace of workforce diversity gains; and the possibility of workforce organizing activity. Such unintended HR developments could seriously impact a client’s ability to maintain the right workforce needed to meet its emerging business and financial objectives.

The HR program changes and consequences that we studied were prospective, i.e., yet to occur, and so we had to develop a simulation methodology to project the subsequent development – or not – of such consequences.

The simulation needed to model three levels of analysis within the firm: its strategy and operations, its HR programs and decisions, and individual employees' and recruits' characteristics and KSAs (Labedz, 2004).

The adjacent figure depicts a causal chain across the three levels of analysis.

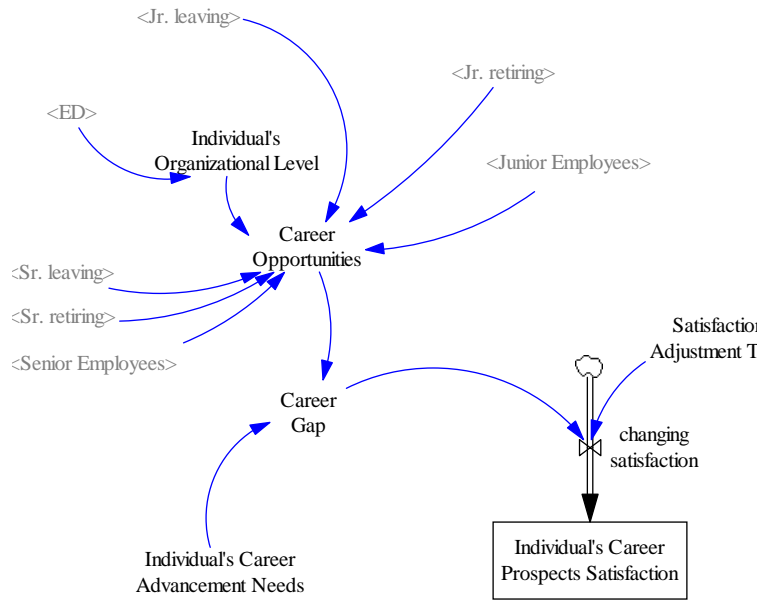


Increasingly, employers pay attention to diverse demographics, and individuals' demographic characteristics, relationships, entitlements and statuses all are relevant to line managers and their HR partners. Understanding the dynamic matching of KSAs offered by individuals to the KSAs demanded by business opportunities, as incorporated in organizational designs and “jobs,” is vital in a global, knowledge-based economy.

Our Initial Hybrid Simulation Approach. To reveal feedback and avoid simplistic assumptions about “average” individuals, we directly integrated two simulation methods in a single model. System Dynamics permits the study of the behavior of systems of interrelated elements. We use SD components to represent certain strategic-, operational- or program-level concerns. We use Agent Based Modeling software ‘agents’ to mimic the behaviors and characteristics of individual employees and to reveal unpredicted consequences of individual interactions. In our early models, heterogeneous employee “agents” are mimicked through arrays of attributes embedded in the SD environment. Each employee “agent” possesses individual attributes – like race, gender, department, date of hire, current salary, employee status, etc. – and acts with considerable autonomy.

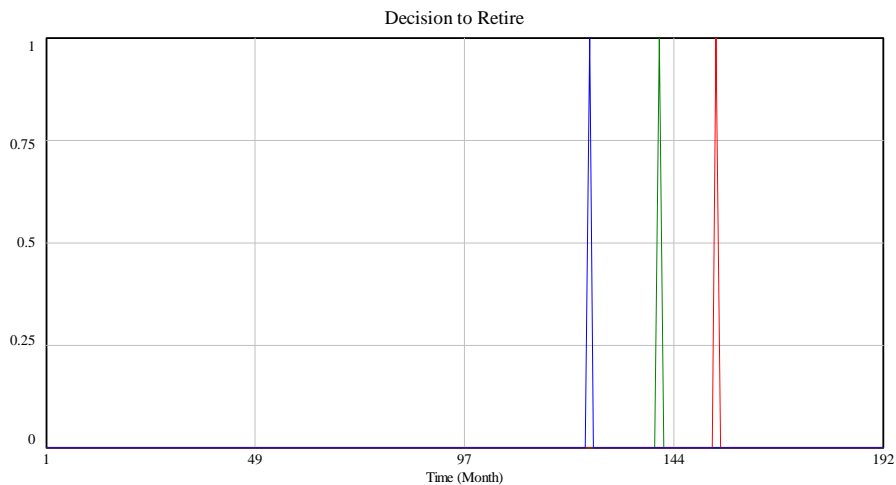
In our initial HR modeling, we dealt successfully with several technical challenges. HR simulation requires policy-feedback modeling, employee-level agency, and the flexibility to implement HR-specific sequencing and iteration. To build sound HR models we have dealt with the necessity of incorporating a fine-grained employee database – an entire embedded HRIS database – in the model. Some HR models (e.g., skills-tracking models) may require the tracking and maintenance of thousands of properties for each of many thousands of employees. This created storage management and computational challenges at the application level that we have resolved.

The next figure depicts a part of our initial simulation model, using SD software to depict individual-level decision making about the adequacy of advancement opportunities available from month to month. In this model, individual data like Current Pay, Credited Service, advancement opportunities and others were created and updated within the umbrella SD environment.



We applied the validation tests common to the SD field (Sterman, 2000) in documenting our simulation results. Among other things, our simulations satisfactorily reproduce historical behavior, show correct behavior at boundaries, maintain dimensional consistency, and pass extreme values and sensitivity tests.

Our simulations are carried through at a very fine level of detail. For example, the magnified raw output below reveals the decisions of three sample employees to retire during a sixteen-year projection period, based on their perceptions of personal retirement income adequacy.



Ongoing and Planned Enhancements. We have undertaken or plan for enhancements dealing with common business concerns. These include docking with dynamic organizational structures which specify formal and informal organizational relationships; attaching dynamic rosters of workers' competencies (KSAs) and matching them with employers' competency demands; and tying our multi-level system models to business performance, by docking with strategy and operations modeling and enterprise research planning (ERP) applications. Beginning late in

2006, to secure better integration among SD, DE, and AB components within our models, we commenced migrating from our prior SD platform. We will instead employ:

- *For model implementation:* A set of System Dynamics, Discrete Event, and Agent Based components operating wholly within a single AnyLogic® platform (XJ Technologies, Ltd.)
- *For model support:* An SQL-driven support platform (MS Access), that furnishes a flexible data-manipulation environment and a conduit between AnyLogic™, client HRIS data, externally supplied tabular functions, and statistical tools such as SPSS® and Stat::Fit®.

Summary. Why should organizations and their advisors dynamically model the firm and its heterogeneous employees? Our approach offers clients and users desirable integrated insights that are otherwise unavailable, affords a tool to avoid or ameliorate real and expensive-to-address unintended consequences, and provides HR professionals a workforce forecasting method across numerous variables of interest that is comparable to dominant Finance and Operations estimation tools. Our approach is adaptable to additional questions in strategic HR management.

The approach offers and supports integrated consulting insights. It fills an HR consulting gap because it exhibits dynamic sensitivity over time, spans multiple levels of analysis, and explains interactions across those levels. It supports insights into strategic HR questions that span functional silos, intra-organizational boundaries and the passage of time.

Alternative approaches are available for the distribution and licensing of RightWorkforce™ models and services. Consultants might license a standard, complete, editable AnyLogic project file (.alp). Consultants and sophisticated end users might choose a standard model or suite of modeling components or utilities, licensed and distributed as a compiled Java file (.jar). A complete model, a compiled Java (.jar) program, able to run from the command line or as a Java applet, might be valuable for promotional use. A consulting firm might contract to participate actively, perhaps exclusively, in our planned enhancements and further development.

The ToPS Group is a partnership of Dataleaf Technologies, Inc, a Massachusetts corporation, and dwww.com.llc, a Rhode Island corporation. Please contact Dr. Stalker (978-369-7735, and georgestalker@rightworkforce.com); or Dr. Labeledz (401-524-7711, and chetlabeledz@rightworkforce.com) for more information, to request a presentation, or to explore contract discussions.

Bibliography: (1) Becker, B. E., et al (1997). "HR as a source of shareholder value: research and recommendations." Human resource management. (2) Labeledz, C. S. (2004). A "Right Workforce" Model of SHRM. Academy of Management conference presentation, New Orleans. (3) Sterman, J. D. (2000). Business Dynamics: systems thinking and modeling for a complex world.