Sky-High Innovation in the Boardroom: Theory-Z for Boards

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Abstract

In the newer, more complex realities that face organizations, governing boards are called upon to provide both oversight and innovative strategy. Parallels between the innovative boards that use John Carver's *Policy Governance* and Boeing's innovative top-tier airplane designers are described. They both employ visionary prototypes (Ends policies for Policy Governance boards and design Ends for Boeing's top-tier designers). Five parallel value-adding features of Ends prototypes that are applicable to governmental innovators are suggested. The visionary orientation of Policy Governance is an important way for government boards to initiate and institutionalize fundamental cultures of innovation.

Key Words: boards of directors; Boeing 787; CATIA; John Carver; Policy Governance; prototypes in innovation.

Introduction

What does John Carver's *Policy Governance*[1] for corporate and governmental boards have to do with the computer-aided design of Boeing's new 787 "Dreamliner"? Yale psychologist Robert J. Sternberg and his colleagues (Sternberg, Pretz and Kaufman, 2003) say that putting together seemingly unrelated topics like these often leads to highly innovative ways of looking at things. In the case of the odd juxtaposition of Carver's Policy Governance and the design of Boeing airplanes, Sternberg and his fellow researchers are right on the money.

According to many leaders who study the subject, boards hold a unique and powerful position from which to provide strategic guidance for innovation. For example, Lauder Professor Yoram (Jerry) Wind, the Wharton School's director of Advanced Studies in Management, even recommends that boards become two boards, one for traditional general oversight (e.g., accounting, finance, law) and one for strategy (to look ahead, to see opportunities, and to guide innovation) (Wind, 2005).   Carver's *Policy Governance*, with its emphasis upon carefully differentiating an organization's ENDS (the vision of what an organization is *for*) and MEANS (what an organization *does* to achieve the ENDS) policies goes a long way toward putting a board in both the oversight and strategies drivers' seats without the necessity of erecting two separate boards (see footnote 1). With Policy Governance you can get the two strong boards Professor Wind recommends for the price of one.

While it is true that most boards currently using Policy Governance wouldn't necessarily see a connection between themselves and innovative, top-level airplane designers, it would be only because they don't know what innovative airplane designers actually do—

especially what they have been doing for the last few years at Boeing. So, what have they been doing?

It all has to do with *prototypes*. What are prototypes? In recent work of my own, I, along with Paul Schimpf (Washington State University) and Hesheng Liu (Martinos Biomedical Imaging Center), have described adaptive processes in the brain that produce creativity and innovation (Vandervert, 2003a, 2003b; Vandervert, Schimpf & Liu, in press). We have argued that the brain's capacity to manipulate *models* so that they are decomposed and adaptively combined with other models constitutes both the beginning and definition of the prototyping process. Further, we propose that this fluid and adaptive manipulation of mental models or prototypes is the key to understanding all creativity and innovation.

This brain-originated prototyping process is what was happening in, for example, Thomas Edison who so faithfully produced sketches of the series of prototype steps that led to his many inventions (see, e.g., Carlson, 2000 for detailed examination of Edison's sketches). Carlson (2000) convincingly argues that such series of innovators' sketches represent the evolution *of mental prototypes* in the mind of the innovator.

What an individual brain like Edison's does to produce innovations is greatly amplified when *groups* of people learn to share the mental models in an organization's prototype development, for example, in the development of a new government program or a company's new, innovative product. Massachusetts Institute of Technology's Michael Schrage points out that nowadays modeling and prototyping are the engines that drive the innovation and performance in the world's best companies:

> Virtually every significant marketplace innovation of this century is the direct result of extensive prototyping and simulation. Consider, for example, the airplane, the animated motion picture, the transistor, the microprocessor, the personal computer, the software spreadsheet, recombinant DNA biotechnology, junk bonds, leveraged buyouts, the Internet and its World Wide Web, financial derivatives, and synthetic securities, and index funds and yield management.
>
> By shifting from physical clay to virtual clay, every major automobile company has radically reengineered its design and production process. Boeing's breakthrough 777 jet was built around the breakthrough digital prototypes. Walt Disney can't produce feature-length animations without storyboards. Microsoft could not enjoy the market share and margins it does without its strategic deployment of beta-version software. Merrill Lynch's ability to model synthetic securities in simulated over-the-counter markets makes it far easier to sell its novel financial instruments to Fortune 500 treasuries. Wherever you look for the fundamental dynamics driving innovation, you find *innovators managing models* [italics added]. (Schrage, 1999: 11-12)

Both Boeing's Top-Tier Airplane Design Partners and Policy Governance Boards Design and Oversee Models

Schrage's point is this: Leading companies are incredibly successful in an increasingly competitive world because *decision-making is guided by models.* Everything Schrage says about innovative companies applies to innovative governmental bodies. Why do models make the difference? According to Schrage, models provide governmental bodies and companies with *socially shared mental spaces* that guide and amplify the efforts of their innovation cultures. This idea squares extremely well with my own work *on how the brain produces innovation.* The most efficient and galvanizing way to realize truly productive innovation is to start with an *envisioning prototype* and to *share* its ongoing development every step of the way.

How Prototyping Works in Boards that use Policy Governance and at Boeing

In Policy Governance, starting with its *ENDS policies*, a government/corporate board acts as the ownership in microcosm (Carver and Oliver, 2002: 5). To accomplish this, the board carefully crafts and *oversees a model, in the form of ENDS policies, of the wishes of the organization's ownership*. The development of this model or "prototype" is the fundamental reason that Policy Governance is such a powerful approach to board governance—the socially shared model embodied in a board's Ends policies opens the floodgates of innovation.

In the same way, the development of the new Boeing 787 Dreamliner involved general high-level "ENDS requirements" that stipulated, for example, that the wing or the fuselage needed to look like such and such (Wilhelm, 2004). After the initial *high-level requirements* were determined, more detailed development smoothly moved forward through *tightly interconnected management teams* spread all around the world. This latter, detailed development constituted the "MEANS" for the airplane's ongoing development. These MEANS consisted essentially of massively *integrated computer modeling*, which will now be described.

Accelerating Innovation: A Look Inside Boeing's Socially Shared Mental Spaces

To see the deep similarities between the design and building of the highly innovative Boeing 787 Dreamliner and the operations of Policy Governance, we can lay out the nuts and bolts of the socially shared mental spaces that led to the development of the 787 and then compare them point-by-point with what happens when a board adopts Policy Governance. This will lead to some important lessons about how surprisingly like the design process at Boeing, Policy Governance creates governmental/corporate value.

Before talking about the unique prototype development process of the 787, we must step back in time to earlier prototyping at Boeing. Starting back in the early 1990's the

Boeing 787's predecessor, the Boeing 777, was the *first commercial airliner that was computer-modeled* into existence. The computer modeling of the 777 was accomplished using 2200 terminals tied into a <u>C</u>omputer-<u>A</u>ided <u>T</u>hree-dimensional <u>I</u>nteractive <u>A</u>pplication (CATIA) system (See Boeing 777 Program Information). The 777's *238 cross-functional design-build teams using CATIA* (kah tee ah) included designers, manufacturing representatives, engineers, finance, suppliers, and customers. This extended digital "society" of design-build teams formed the 777's *innovation culture.* The rapidly evolving prototype of the 777 "floating" inside the interactive 3D world of CATIA, was arguably the most widely and completely *shared mental space* of all time— it was a great worldwide, digitally mediated *"mind-meld"* involving thousands of 777 stakeholders—the ultimate in innovative MEANS strategies.

Models Create Value By Translating Stakeholders'/Owners' Wishes Into Innovative Performance

In the case of the modeling of the new 787 a powerful, equally new tactic was added. In addition to prototype modeling in a newly advanced version CATIA, the general ENDS requirements for the 787, as mentioned earlier, were worked out with Boeing's high-level partners *from the very beginning.* This essential difference between the 777 and the 787 in the ENDS/MEANS relationship was explained to me by Mike Bair, Boeing Vice President and General Manager of the 787 program:

> We were far more into the details with the 777. What we're doing now is saying there are general high-level requirements—the wing has to look like this—but you go figure out how to do the inside of the wing to fit your factories. It's a far more *collaborative approach* [italics added] to our partners than we've ever used before. (Mike Bair, e-mail message to author, February 17, 2005)

The difference in the approaches between the 777 and the 787 that Bair describes is basically the same shift toward an emphasis on ENDS that occurs when a board moves from traditional board governance to Policy Governance (see footnote 1). An *envisioning prototype* is put right in the front end of the process. The value of this move for boards is the same as it was for the Boeing 787 program. When ENDS are specified upfront by the top-tier players, <u>means</u> prototype modeling is better articulated and management is more innovative and efficient—put simply, the "prototype effect" Schrage described is primed to kick in, and it swiftly ripples down through management. I believe that this is precisely what must be done in ALL governmental agencies: Set the Ends priorities (the prototypes), and then let the ingenuity of management have at—this is a great "bureaucracy-busting" tactic!

Among boards that use Policy Governance this ENDS-driven articulation of MEANS is just as overt as it was in the 787 program. Specifically, in Policy Governance a systematic connection between ENDS and MEANS is guided by a *nested bowls model* which serves as the counterpart to the 787 program's connection between general high-level ENDS and the detailed design work through CATIA (See Carver and Oliver, 2002: 9-26).[2] In Policy Governance, a board's larger (high-level) decisions are represented by

the larger of the nested bowls, and the right to make these decisions is retained by the board. The smaller, nested bowls represent related, more detailed decisions that are delegated to management (in the same way they were *handed over to CATIA* in the Boeing 787 program).

In both the 787 program and in Policy Governance the innovative power of socially shared mental spaces extends all the way from a board's decisions to the final product. There is complete freedom to innovate in the development of the respective ENDS policies and, yet, there is also great freedom to innovate within the respective MEANS utilized by management. At the same time, ENDS and MEANS are as connected as the top-tier partners (or a board) want them to be. (See footnote 2.)

Parallels Between Boeing's General High-Level Requirements (and CATIA) and the ENDS and MEANS of Policy Governance Provide Lessons

As Michael Schrage observed for all corporate prototyping, the revolutionary success of Boeing's approach to the 787 makes it clear that *socially shared models* bring into existence highly successful innovative teams. For the same reasons, Policy Governance can do the same thing for any government or corporate board. Here are five interrelated lessons about how the immense value-creating behavior produced by Boeing's approach to designing airplanes can be extended to government and corporate boards that adopt Policy Governance:

   1. Value Creation

The tier-one development of the evolving 787's high-level requirements provided a sophisticated socially shared mental space thereby creating innovative design-build teams from the get-go. Such ENDS policies can be made clear to everyone right up front in both Boeing's approach and Policy Governance. The 787's initial planning and then CATIA follow-through shows a seamless interconnectedness from the stakeholders' wishes to the quality of the final airplane. In the same manner, the "virtual clay" of Policy Governance can provide ALL governors with an equally sophisticated socially shared space and management follow through. The lesson: Policy Governance ENDS policy prototyping and guided MEANS development can turn both boards and management into innovative teams. The resulting innovation can create new value for stakeholders.

   2. An Extended, Energized Community of "Design-Build Teams"

Like the 787 tier-one, high-level requirements partners, Policy Governance boards can become centers of extended, innovative teams. In identifying and linking with the extended ownership and stakeholders (like Boeing's tier-one risk-sharing partners— Alenia Aeronautica of Italy, Fuji Heavy Industries of Japan, Kawasaki Heavy Industries of Japan, and so on), Policy Governance boards can draw the best people and thinking into the development of ENDS policy. Schrage says this mix of stakeholders creates a "charismatic prototype." The lesson: As Schrage says of all interesting prototypes, a

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board's development of Policy Governance ENDS policies can "emit the social and intellectual equivalent of a magnetic field" (Schrage, 1999: 27).

3. Optimization

In the case of the development of the 787, the modeling of the shared mental space of general high-requirement "ENDS policies" compounded the innovative input and capacities of all stakeholders involved. In the same way, the socially shared mental space of ENDS policies in Policy Governance compounds the innovative capacities of all boards. That is, over time, the *interactive development* of ENDS policy moves boards steadily toward innovation and performance optimums. The lesson: The prototyping of ENDS policies in Policy Governance can lead boards to optimum levels of innovative performance.   And, there may be no other way to get there.

4. A Single Voice

The various factions within the management of a government or corporation or within its board can make it difficult to know which of many paths to follow. A shared ENDS prototype provides a medium for focused conversation at all levels.

The evolving 787 prototype in both the general high-level requirements and CATIA provided a "single voice" that focused the talents and skills of all involved. Henry Shomber, Chief Engineer for the earlier Boeing 777 design-build teams, recently told me that the biggest thing that held up the initial move to CATIA was that it redefined the roles of thousands of engineers to become single-voiced. This single voice was not a straightjacket in any way; it was a flexible, socially shared mental space, a prototype. The newer 787 airplane prototype, starting with its general high-level requirements and then on into CATIA also became the single, focused voice (yet with immense built-in freedoms as mentioned above) for all subsequent design-build teams. The lesson: In precisely the same way that the Boeing 777 and 787 prototypes provided *a medium for focused conversation,* the ENDS policies of Policy Governance both permit and reinforce boards to speak with a single voice.

5. Boards Become Visionary:

The virtual modeling of both the Boeing 777 and 787 allowed their oversight and design-build teams to be collectives of *visionaries and dreamers* in terms of incorporating long-range planning into the plane. Likewise, the "virtual clay" of the ENDS policies of Policy Governance is inherently the best medium for long-range planning in any governmental body or corporation. Of course boards do not do the actual planning of "events"—that involves staff MEANS—but boards must set a visionary course by carefully identifying and linking up with the wishes of the ownership. Getting "there" takes time, and therefore ENDS policies must be framed in long-range terms. Carver expressed the future-orientation of the vision of ENDS policies this way:
> Board data, dialogue, and decisions include the probable
> environmental circumstances of the future, shifting public needs,

> big-picture strategic swaps, and the intentions of other boards
> working on their own visions—in other words, highly informed
> dreaming. (1997: 67)

The same future-oriented, big-picture, collaborative philosophy oversaw the modeling of the 777 and, then, even more intensely, the modeling of 787 "Dreamliner." The lesson: Socially shared mental spaces that extend across a variety of future conditions ("highly informed dreaming") are the ultimate approaches to innovation for all governmental bodies and corporations. The ENDS policies of Policy Governance are dedicated to just this task.

Conclusion

Today, the Boeing Dreamliner example demonstrates that organizations create value best through visionary planning that, like the brain itself, places prototyping right up front. This echoes Carver's contention that directors best serve the owners through well-developed Ends policies that clearly provide a vision not of what the organization does, but of what it is for. One way to look at what is happening through an emphasis on this ENDS type of vision is that as world competition becomes tighter and tighter both governments and companies are being forced to operate in accordance with progressively higher and higher levels of human capacities for organizing and planning. This notion brings us directly back to the prototype-driven innovation that Schrage describes as the key to success—prototypes and Ends policies are the embodiment of the innovative visionary process, first in the creation of ideas and then in turning those ideas into value-producing products and services.

As a historical note, it seems no coincidence that during the same period the world's best company management teams were creating value through advanced prototyping methods, many boards were transforming themselves by going to the directly analogous model of Policy Governance. It is now apparent that Carver, with his scientific background and extensive experience with boards, caught the pervasive corporate prototyping trend toward value creation and innovation described by Schrage and applied it directly to board governance in the form of Policy Governance (See Oliver, 1999: xiv-xv). In reply to Wind's (2005) proposal that boards should become two boards, one for oversight and one for visionary and innovative strategy, it seems that Carver's Policy Governance deserves to be seen in this newer light of accomplishing both jobs.

About the Author

Larry Vandervert is a researcher in psychology and the neurosciences. Two of his recently published titles include "The Neurophysiology of Innovation" (Elsevier, 2003), and "How Working Memory and the Cerebellum Collaborate to Produce Creativity and Innovation" (in press, *The Creativity Research Journal*). Dr. Vandervert is a former board member of Spokane Public Schools and a Fellow of the American Psychological Association.

Endnotes

1. Carver differentiates Policy Governance from other governance approaches as follows:

> In contrast to the approaches typically used by boards, Policy Governance separates issues of organizational purpose (ENDS) from all other organizational issues (MEANS), placing primary importance on those Ends. Policy Governance boards demand accomplishment of purpose, and only limit the staff's available means to those which do not violate the board's pre-stated standards of prudence and ethics. [ENDS policies focus not on what the organization does (that's management), but what the organization if <u>for</u>.] (John Carver, "The Model")

This article should in no way be interpreted as an advertisement for Policy Governance. In its relation to recent developments at Boeing, Carver's model of board governance is presented in a purely objective manner only to show the parallels between the two.

2. Policy Governance covers every aspect of the organization without becoming involved in micromanagement:

> [Policy Governance] *Encompasses the whole job.* Governance must be designed to cover the board's accountability for every aspect of the company [or government agency]. However, it must also be designed so that the board's reach does not exceed its grasp. The model enables a board to embrace yet not become entangled in the entire company. The model does not tell directors the content of their decisions, but it does provide a framework within which they can make effective decisions about everything in and under their authority. (Carver and Oliver, 2002: 10)

Policy Governance uses a nested bowls analogy to illustrate the breakdown of a potential universe of board control decisions into smaller decisions that can be left <u>*to reasonable interpretation*</u> by management. The nested bowls approach provides a seamless web of accountability connecting board ENDS policies with the MEANS developed by management.

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