APPLICABILITY OF BUSINESS MODELS IN STRATEGY FORMULATION AND EXECUTION: LESSONS FROM THE *ATLAS* EXPERIMENT AT *CERN*

by

Timo J. Santalainen, Helsinki School of Economics and *STRATNET*
Markus Nordberg, ATLAS/*CERN*
Ram B. Baliga, Wake Forest University

Paper prepared for SMS 27th Annual International Conference "The Challenges of Non-Market Influences on Market Strategies", October 14-17, 2007, San Diego, USA.

CERN - The 'Ultimate' Knowledge Organization

Founded in 1954, and straddling the Franco-Swiss border near Geneva, CERN (European Organization for Nuclear Research) is the world's largest particle-physics research centre. CERN was one of Europe's earliest joint ventures designed to establish European preeminence in sciences. It is currently supported by twenty member states. CERN exists primarily to provide physicists with the infrastructure and tools such as accelerators to study the building blocks of matter and the forces that hold them together. CERN employs approximately 2200 people: physicists, engineers, technicians, craftsmen, administrators, secretaries, workmen. CERN's scientific and technical staff design, build, operate and maintain laboratory equipment. They also assist in running, analyzing and interpreting data gathered from complex scientific experiments conceived by more than 7000 scientists and engineers (from 500 universities and over 80 nationalities), who come to CERN for carrying out their research.

CERN is governed by a Council that is ultimately responsible for all important decisions including policy, programs, activities and budgets. The Council is assisted by the Scientific Policy Committee and the Finance Committee. The Scientific Policy Committee assesses the scientific value of the activities proposed or pursued by scientists and makes recommendations regarding specific programs to pursue or continue. Its members are scientists who are either elected by their colleagues or appointed by the Council on the basis of scientific eminence without reference to nationality. Some members are also elected from non-Member States. The Council also appoints the Director General, usually an eminent scientist, who is responsible for managing CERN on a day to day basis. The Director General, in turn, is assisted by a Directorate and runs the lab through a series of departments.

Despite having gained world-wide recognition for its high quality research, CERN is frequently challenged by member-states to justify its focus on basic sciences. These challenges increase when member-state budgets are under strain and member-states have to decide whether it is in their best interest to continue to fund CERN activities to increase stock of scientific knowledge or divert these resources to some other activities (such as research in life-sciences) that may have greater short-term societal payoff. To counter such challenges, Directors General have over the years, among other measures, pointed to studies that attest to significant economic and social benefits from CERN research and technology contracts awarded in pursuit of basic research. Often cited representative contributions include advanced cancer therapy, non destructive testing of materials, complex simulation tools and the creation of the World Wide Web.

Since 1954, physicists at CERN have been exploring the structure of matter at its smallest scale and rewinding the clock of the Universe back to its origin. The objective of this long quest, of which the Large Hadron Collider (LHC) is the latest significant step, is to understand how matter was created and what it is ultimately made of. The Large Hadron Collider, a $3 billion accelerator, due to be switched on in 2008, will send protons, the positive charged particles in atomic nuclei, racing around a tunnel 27 km in circumference at nearly the speed of light. One beam will travel clockwise while the other travels counterclockwise until they collide with energy of 14TeV[1].

The beam collisions create showers of new particles, which scientists hope will enable them to experimentally test a key component of the Standard Model of the Universe: Why do elementary particles have mass and why are their masses different? The Standard model conjectures that space is filled with a 'Higgs field', and by interacting with this field, particles acquire their masses. Particles which interact strongly with the Higgs field are heavy, whilst those which interact weakly are light. The Higgs field has at least one new particle associated with it, the Higgs boson. Detection of the Higgs boson would validate the Standard Model.

Higgs-particle is the missing link in the Standard Model unifying the seemingly very different three types of basic forces governing the properties of matter. The Higgs makes a connection between elementary particles which have (rest) mass and those which don't. It is one key component in explaining Dark Matter, a mysterious form of invisible matter which we expect to be present in our Universe. Moreover, it may help to set us on a new course to explain what gravitation is all about.

Going beyond the standard model, LHC could also test some theories attempting to unify the four forces—gravity, electromagnetic, weak and strong. A very popular idea unifying the forces is called supersymmetry or SUSY in short. SUSY predicts that for each known particle there is a 'supersymmetric' partner. If SUSY is right, then supersymmetric particles should be found at the

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[1] One TeV corresponds to the energy released by ca.1000 protons if converted into energy based on Einstein's famous equation $E=mc^2$.

LHC. Other experiments could also help in the resolution of the remaining antimatter riddle – why is there hardly any antimatter left in the Universe?

There are four different LHC experiments or particle detector systems operating in parallel at CERN to study the particle collisions. The two larger ones, ATLAS and **CMS,** are specifically designed to detect the Higgs boson, among other particles. **ATLAS** and **CMS** are multi-national, cross disciplinary research projects and amongst the largest collaborative efforts ever attempted in the physical sciences. Over 2000 physicists and engineers (including some 300 students) from more than 150 universities and laboratories in 30 countries are involved in each of them.

ATLAS and **CMS** will rely on some of the most complex and precise scientific instruments ever created. Their detectors comprise over 100 million individual detection channels, each looking for tell-tale signs of new particles and phenomenon—40 million times a second! Rather than focusing on a particular physical process, **ATLAS** and **CMS** are designed to measure the broadest possible range of signals triggered by the new particles. This hedging strategy is designed to ensure that whatever forms any new physical processes or particles may take **ATLAS** and **CMS** will be able to detect them and measure their properties. While potentially resolving some fundamental issues concerning the fundamental nature of matter and basic forces that shape our universe, the experiments could throw up some surprises that fundamentally alter the current view of the Universe. Were this to happen it could create a new cycle of theorizing and experimentation.

In Search of Management Advantage at *ATLAS*

Consistent with Hagstrom's (1974) characterization of research as a competitive activity for obtaining recognition and credit, the teams of scientists working on **ATLAS** and **CMS** are in friendly competition with each other. With the Nobel Prize potentially hanging in balance, each team dreams of being the first to find the Higgs boson or something of equivalent importance hoping to leave the other team to confirm its discovery. Consequently, each team sees an advantage in being the first to launch its experiment when the LHC starts to produce collisions.

Both **ATLAS** and **CMS** function as fairly autonomous entities within CERN with each entity having its own management team to manage the two phases of the experiment:

1. The construction phase.

2. The post-construction phase that includes operating the actual experiment, data collection and analysis.

As two of the authors have been working with **ATLAS**, we focus on **ATLAS** in this paper but we would expect **CMS** to be very similar, too. Specifically we will examine whether or not cognitive exposure to strategic thinking and business models have made a difference in moving **ATLAS** forward.

In a broad sense, **ATLAS'** management functions as an executive body, carrying out the wishes of the Collaboration Board (representing all participating research institutes involved in the experiment and functioning as the highest decision-making body for the experiment)[2]. Technically, **ATLAS'** management is in place for the duration of the experiment (on a rotational basis) though there appears to be an implicit understanding (though no guarantees) that they could continue at CERN following the project's conclusion.

The task of **ATLAS'** management is to ensure that **ATLAS** is built and operated along the lines specified in the Memorandum of Understanding (MOU). The MOU specifies the governance structure of the experiment and the responsibilities of key personnel involved in the project. As per the MOU, **ATLAS'** Spokesperson, Technical Coordinator and Resources Coordinator must be hired by CERN with the latter two reporting to CERN management. In practice, in order to ensure **ATLAS** management's responsiveness to the scientists conducting the experiment, the coordinators are elected by the **ATLAS** Collaboration Board for two year terms.

In contrast to top management at for-profit organizations, **ATLAS'** management has only limited legitimate power to get its task accomplished; rather it has to accomplish its overall task by coordinating the multitude of subprojects[3] that comprise the experiment and acting as an impartial arbitrator in

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[3] These are complementary sub-detectors and systems (SCT, Pixel, TRT, TileCal, Liquid Argon, Muons, magnets, electronics, computing etc). needed to find the Higgs and other new predicted particles.

the event of disputes. Coordinating these tasks is particularly challenging as any technical changes proposed can create resource allocation problems and potentially delay construction of the experiment. Rather than imposing its views on proposed changes **ATLAS′** management provides **ATLAS** Collaboration Board with the opportunity to vet and approve major change requests[4].

Given the importance of being ahead in the installation schedule permits the **ATLAS** team to reflect on ways how to best operate the detector and discover the Higgs boson first and "beat" the **CMS** team. **ATLAS′** management defines its "success" in terms of ensuring that both construction and post-construction phases are executed in a timely manner without compromising the physics discovery potential of the detector. As **ATLAS′** construction is being done by numerous project groups and communities building their own sub-detectors, **ATLAS′** management sees pulling together these highly decentralized groups into one entity crucial to success of finding the Higgs boson. Given the complexity of managing this transformation process from construction to operation successfully, **ATLAS**′ management invited an external strategy consultant to assist in the process.

Through discussions with representatives of **ATLAS** management, the consultant determined that the following objectives had to be achieved:

1. Ensure the completion of the construction phase in a timely manner and start operating ATLAS in a reliable manner (eliminate hardware breakdowns that could result from wrong settings etc.).
2. Break subsystem silos to prevent them from optimizing their own performance at the potential expense of **ATLAS′** (global system performance). Breaking down the silos would necessitate clarifying the roles of **ATLAS** scientists and managers to minimize time and resource draining dysfunctional conflicts.
3. Recruit and retain the most talented people. Retention would necessitate rotating them through different positions and providing them with opportunities to shine in their tasks.
4. Develop capabilities and processes to ensure that data collection and analysis were accomplished in timely fashion.

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[4] This is particularly the case for sub-systems delivered as in-kind by the participating countries but not so for common systems financed collectively by the Common Fund by all participating countries. The Common Fund is run by the ATLAS management and for the execution of it, the Technical Coordinator is responsible. The role of the Collaboration (Board) is here less explicit in the daily aspects of it.

5. Enhance strategic thinking capabilities within **ATLAS'** management team in order to prepare them to confront "What's Next?" i.e. the post-LHC (**ATLAS)** phase. A successful answer to this question was seen as the key to increasing their employability following the conclusion of the **ATLAS** experiment (> 2020?).

Given the time pressures and resource constraints that **ATLAS'** management was under, the consultant felt that these issues could best be addressed by adopting the cognitive school (Mintzberg et al, 1998) philosophy, i.e. exposing the management team to concepts, frameworks and tools in strategy formulation and execution. Such exposure was also designed to create a common language that managers could employ to convey issues and obtain resolution.

Three workshops were conducted for **ATLAS'** management during the time period 2002-2005. The first workshop, conducted in August 2002, focused on developing strategic thinking capabilities. The sessions were built around Hamel's Business Model (Hamel, 2000) and the 'Strategy Diamond' (Hambrick & Fredrikson, 2001) frameworks. Exposure to these was seen as a way to get the participants to understand concepts of business models and strategy in order that they could critically examine their own. The consultant was interested in getting the participants to create an **ATLAS** Business model (a la Hamel) in order that participants could discern the relationships between an explicit (recorded) core strategy and strategic resources, understand the role of customer interfaces and the value network. The participants successfully crated a 'business model' for ATLAS, a model that was referred to as the ATLAS Business Model (ABM) in subsequent discussions.

Following this the consultant was particularly interested in ATLAS codifying a strategy rather than providing a collection of shared, implicit views and if failing to obtain one, what this "absence of strategy" (Inkpen & Choudhury, 1995) would suggest. It was the consultant's belief that working with appropriate partners in the value network could provide **ATLAS** with a strategy execution advantage. 'Leading change' (Kotter, 1996) concepts were also introduced toward the end of the first workshop in order to get the participants to start thinking about the process of transforming the various subgroups into a well functioning unit and to move the organization from the construction phase to the post construction phase with widely different set of challenges and priorities.

The second workshop was conducted in January 2004 and focused on understanding the strategic resources available to **ATLAS'** management and issues involved in creating value for the various constituents and the experiment as a whole. As most of the resources of concern were human, discussion was centered on the concept of the "individualized corporation" developed by Bartlett & Ghoshal (1997). The individualized corporation concept was deemed to be particularly valuable as people involved in **ATLAS** had high levels of expertise and could not be "managed" in the traditional, hierarchical manner. Value Network (Hamel, 2000) issues were also introduced for deliberation. Specific issues addressed were: How to obtain and retain top talent? How to be an attractive partner for entities outside **ATLAS** that could provide essential resources? As a host institution how could CERN provide a "parenting" advantage to **ATLAS**? Effective management of internal and external interfaces and processes were also discussed at length as these were considered crucial in minimizing delays and ensuring that the post-construction experimentation, data collection and data analysis phases proceeded without a hitch. These deliberations resulted in the development of several practical action plans and policies such as the development of a "Code of Conduct for Partnering".

The final workshop was held in September 2005. Strategic transformation was the main thrust of this workshop. The focus here was: How to transform the current construction-driven **ATLAS** organization into an effective data collection and analysis one for 2008 and beyond. Strategic transformation was explored along four dimensions: core operations, customer interface, structures, systems and processes, and people (see e.g. Gouillart & Kelly, 1995). Ideas on developing operational efficiency were structured around the concept of value chain, i.e. how to create seamless core processes and structures both inside **ATLAS** and with collaborators. Coming full circle, ATLAS management was also encouraged to deal with the "What's next?" question.

As should be evident from our discussion above the consultant in selecting specific topics for the workshops assumed that the **ATLAS'** management team would benefit greatly from thinking about ATLAS in "business" terms rather than "science" terms. If this were true than the various concepts and frameworks to which the participants were exposed to would make a meaningful difference in resolving the issues identified above.

In order to assess the impact of the three workshops, in summer of 2007, nearly two years after the conclusion of the final workshop, participants were individually invited to respond to the following questions:

1. Which of the organized sessions were most interesting and valuable (in terms of managing **ATLAS)**? Why?
2. Were the issues discussed of relevance to the functioning of today? If so, Why?
3. What were the shortcomings, if any, of the workshops in terms of the content?

Responses and Discussion

Over half the participants found the first workshop--focused on getting the team to think more in ”business terms” rather than ”pure-science” terms by exposing them to business strategies and business models—to be of very limited value in dealing with the project management challenges facing them. In examining the underlying reasons behind this conclusion it became apparent that, right from the outset, participants regarded business strategies and models to be ”too abstract”. They saw **ATLAS** driven more by scientific considerations rather than by arguments of economic or organization efficiency and thus felt business concepts could only be applicable in limited areas.

Why do participants come to this conclusion? In our judgment this is due to the fact that the participants interpreted strategy and business models from the planning school perspective (Mintzberg et al, 1998), i.e. goals/objectives set, strategy developed, action plans specified and implemented. While the goal of an experiment such as **ATLAS** is clear, the complexity and technical uncertainties associated with the project really preclude such a linear approach. For instance, in the Hamel model where the core strategy is built on strategic resources there is a presumption that this can be done so fairly easily and concretely whereas in an experiment such as ATLAS it may be difficult to decide ex ante which resources are needed and which are strategic in a broad sense.

A project such as ATLAS encounters technological hurdles almost every day and the severity of these problems determines the manner in which they are attacked and solved. This often requires using parallel teams and choice of multiple technologies which can’t be foreseen or planned ex ante. It is our contention that participants would be more accepting of the evolutionary or incrementalism school (Quinn, 1988) as this would be consistent with their reality. From this perspective the key actions/decisions needed to make the experiment a success would be evident only retrospectively. The participants, however, are comfortable with this as they are fundamentally driven by the outcome (an experiment that works) rather than worrying in advance of all the specific actions/decisions to get there.

Figure 1 about here

The problem with this (from **ATLAS'** management perspective) is that this approach is not suitable for an "active" conceptualization and management of strategy or business model.

A few of the participants were open to accepting an entrepreneurial perspective (Mintzberg et al. 1998). This perspective is justified if one considers that principal investigators/scientists embarking on large-scale science experiments such as **ATLAS** have to effectively communicate their strategic intent and vision to find a home/base (such as CERN), attract needed top notch scientific talent as well as monetary resources. The probability of doing so increases if the scientific issue being probed is compelling enough (as is the case with **ATLAS).** As is often the case with start-ups, the original proponents of the project have to be willing to "modify" the experimentation process and, in some cases, even the intent as they seek to obtain the necessary resources. Furthermore, the principal investigator or investigators have also to be open to sharing some of the credit, were the project to succeed. This is akin to founders of startups who have to be willing to dilute their own holdings as new funders come on board or provide an exit strategy for the initial funders, that is appealing enough for them to make the initial contributions.

While the start-up analogy has merit, we are of the opinion that given its semi-autonomous character, mission and the technical uncertainties that it has to deal with on a daily basis, **ATLAS** is best seen as an mammoth project **adhocracy** (Mintzberg, 1988) whose teams of experts solve complex problems on their own behalf**.** This is in contrast to conventional operating adhocracies that work on behalf of a client. The technical uncertainty arises from the fact that a number of elements of the experiment are being built for the first time and there is limited experience or history to guide them. In order to increase the odds of success in resolving technical problems, teams work in parallel to come up with the best solutions. As solutions generated and selected for particular subsystems or elements may necessitate changes in elements that had been decided earlier, the whole process tend to be iterative and non-linear.

Progress is made by moving backwards (to correct mistakes and change design parameters as a better understanding of design and construction issues is obtained) and forwards. Making these changes is complicated by the sheer number of elements (more than 20 million on any account), their interdependence and the willingness of "settled" subsystem team members to accept these changes and rework their own subsystem. Even though there is some temptation to defend turf and particular approaches adopted by particular subsystem teams, at the end of the day, these are resolved though technology and science considerations and the desire to move forward. The **superordinate goal** of positioning **ATLAS** for discovery of the Higgs boson facilitates changes and resource reallocation and **limits means end inversion**. Overall the project proceeds in a collective, collegial manner.

All of this places a premium on flexibility and prevents the development or acceptance of pre-determined formal processes characteristic of well functioning business organizations executing their strategy. At best project members may accept **soft formalization**--agreed ad hoc, problem-centered **procedures** to limit conflict and maintain the needed flexibility. Such procedures are important to move the project forward as they ensure people work and interact in some coherent manner, reduce unnecessary uncertainties and confusion in the process. They help to identify and understand what people are specifically doing and why. All in all mutual adjustment is the dominant form of coordination.

When looked at from a business model perspective, the whole process appears imprecise and lacking a "business plan". The lack of detailed technical road maps, the approach of using parallel solution development, recurrent changes to subsystems or elements that have already been set, appear wasteful and inefficient and beg to be structured. A closer look at the situation, however, suggests that it is the willingness to keep options open and not being wedded to a particular option or approach until the last moment that is crucial in resolving issues and making progress in the very complex and scientifically and technically challenging environment.

Given the complexity and fluidity of the situation at any point in time and a significant chunk of their time and effort devoted to handling perturbations it is not surprising that no one involved in the process (including **ATLAS** management and CERN representatives) is too concerned with formulating explicit strategies, "business" models or even worrying about understanding the actual process that is moving the experiment forward. The need for strategic thinking and worrying about "What's Next?" is further obviated if one recognizes that projects such as **ATLAS** have a built-in sunset/demise clause. **ATLAS** ends when the experiment ends. In this sense, unlike CERN (which has to ensure that there is a stream of projects to host that justify its continuing existence), **ATLAS** members have an experiment focused mind set, rather than an organizational mind set. If there is any thinking about the future it is clearly in terms of "what new physics is out there?" to pursue rather than how to stretch out the current project. Given the top notch caliber of most, if not all, personnel involved in **ATLAS** this is also probably not a significant concern.

Given that their appointment is technically only for the duration of **ATLAS**, one would think that **ATLAS** management would be more concerned with "What's Next?", strategies and business models not only in order that they can manage **ATLAS** effectively but also use this insight in their next job. The response of ATLAS workshop participants to the question of "Whether thinking in terms of a Business Models, specifically the ATLAS business model was valuable?" is very revealing. Most members' response was in the negative. Their reasoning was as follows:

> *ATLAS business model (ABM) reflects a snapshot in time, a moment's reflection of what we are doing. A moment later things have evolved and they keep on evolving. The specific trajectory along which we will move cannot really be predicted given that we are moving in complex, unchartered waters. The destination, however, is clear and unchanging (finding Higgs). We will know when we get there…so it is not possible to apply ABM in any meaningful way because people can't be told to preached what to do as no one as all the answers at hand. ABM is too abstract and general to work as a guide as it cannot keep up with the changes which are unpredictable.*

In addition to the above, we feel that the need for **ATLAS**' management to consider "What's Next?" was reduced somewhat by their perception that they would find employment within CERN, following **ATLAS'** culmination, if they so chose.

Overall, did the workshops make much difference to the functioning of ATLAS' management? Specifically did it achieve its objectives of

1. Finishing the construction phase in a timely manner by reducing subsystem optimization and conflicts between groups?
2. Preparing ATLAS for the post -construction phase?
3. Increasing strategic thinking?
4. Retaining talented people?

If one looks at the participant responses objectively the answer has to be "Not significantly". In retrospect it is clear that exposing ATLAS' management to fundamental business oriented strategic thinking concepts and frameworks were done with somewhat optimistic expectations. Furthermore, the manner in which ATLAS members used self correction mechanisms to deal with vexing perturbations and move the project forward was significantly different from silo thinking and turf battles that characterize typical business entities. The power of the superordinate goal of discovering Higgs and other particles as well as the scientific ethos was overlooked by the consultant in designing the input. It also became clear in the responses that looking ahead and wondering about "What's Next" beyond the LHC was of little or no concern to **ATLAS'** management and **ATLAS** participants who had their hands full trying to get **ATLAS** going. It is also conceivable that they perceive that the post construction experimentation, data collection and data analysis phase could extend out substantially such that the need to think about the future is further attenuated.

None of the participants commented on talent recruitment and retention, an issue that was considered an important issue in developing the content of the workshops. We can only surmise that the inherent attractiveness of **ATLAS** is so great that this was not an issue.

Is there an alternative explanation for the attitude shown by ATLAS' management toward strategic thinking and business models? Such a result is consistent with the notion of a **parastatal,** i.e. public or ideologically led organizations get stuck in-between public and business management logic as pressure towards increased effectiveness and results grow from the part of stakeholders. This is elaborated in Figure 2.

Figure 2 about here

While the basic **mission** of **ATLAS** stays in "pure" basic research, the following pressures towards business-orientation are emerging as CERN struggles with funding issues and providing continuing infrastructural support.

1. **Ownership**. As governments and institutions are experiencing growing pressure towards businesslike management they cascade such expectations to institutions such as **CERN/ATLAS**.
2. **Earning logic**. Stemming from the above some pressure for commercializing research results loom around CERN, less so in ATLAS (just think about the value of World Wide Web). According to CERN scientific values, research results are disseminated widely. precluding significant commercialization through intellectual property protection. Only four percent of CERN's budget currently comes from such commercialization.
3. **Users and clients.** Users of ATLAS are getting more and more focused on results. This is having a greater impact on the culture driving transformation towards business-orientation.
4. **Workforce.** While being loyal to the basic mission top managers, project managers and senior experts find themselves straddling two worlds: that of ideological basic science and another calling for business-like effectiveness. New skills and competencies (e.g. networking and partnering) are needed as well atop of professional expertise.
5. **Structures and processes.** Managerial frames, tools and processes were assumed to be the basis of generating a transformation in structures and processes.. However as seen above the results were decidedly mixed. More explicit focus on structure and processes may have been beneficial .

Lessons Learned

Do the findings from the ATLAS intervention have anything to teach us about managing innovation? This issue is now front and center as many firms in the Western world have come under the Chinese onslaught. Having yielded a significant chunk of manufacturing capacity to the Chinese, Western firms are now seeking to compete through innovation. Innovation has two components: an invention/discovery component and a business model component that translates invention into innovation (Chesbrough, 2003).

Thus, if firms are to compete on the basis of innovation it is critical that research efforts (invention) be productive and that appropriate business models are also developed. There is great interest in improving the productivity of research and this interest has been heightened as a result of low productivity of research in pharmaceutical companies.

Firms are attempting to increase research lab accountability and are trying to structure the research process. Such attempts to use a structured process to think about research strategy and develop a "research business model" are likely to be perceived as an attempt to structure the unstructurable. In Mintzberg's configuration terms this would appear to be an attempt to manage an adhocracy, as a professional bureaucracy or in the extreme as a machine bureaucracy. If ATLAS is anything to go by this attempt is likely to have only a very limited probability of success, and likely to lead to mean-ends inversion.

A better approach may be to create a focused superordinate goal (a la discover Higgs)—derived from "market needs" -- and let the researchers loose. Creating the right context - rather than specifying processes and using short term performance metrics - may indeed be the key to long term success.

References

Bartlett, C.A., Ghoshal, S. 1997. *The Individualized Corporation: A fundamentally New Approach*. Collins: New York, NY.

Bossidy L., Charan R. 2002. *Execution: The Discipline of Getting Things Done.* Crown Books: New York, NY.

Chesbrough, H.W. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Havard Business School Press: Boston, MA.

Gouillart, F.T., Kelly, J.N. 1995. *Transforming the Organization*. McGraw Hill: New York, NY.

Hambrick, D.C., Fredrickson, J.W. 2001. Are you sure you have a strategy? *Academy of Management Executive*, Vol.15. No.4: 51-62.

Hamel, G., 2000. *Leading the Revolution.* Harvard Business School Publishing: Cambridge, MA.

Inkpen, A., Choudhury, N., "The Seeking of Strategy Where it is Not: Towards a Theory of Strategy Absence", *Strategic Management Journal*, Vol. 16, No. 4 (May, 1995), pp. 313-323.

Kotter, J. 1996. *Leading Change.* Harvard Business School Publishing: Cambridge, MA.

Mintzberg, H., Quinn, J.B.1988. *The Strategy Process: Concepts, Contexts and Cases*. Englewood Cliffs, N.J.
Quinn, R., 1988. *Beyond Rational Management*. San Francisco, CA.
Santalainen, T. 2006. *Strategic Thinking*. Talentum: Helsinki.

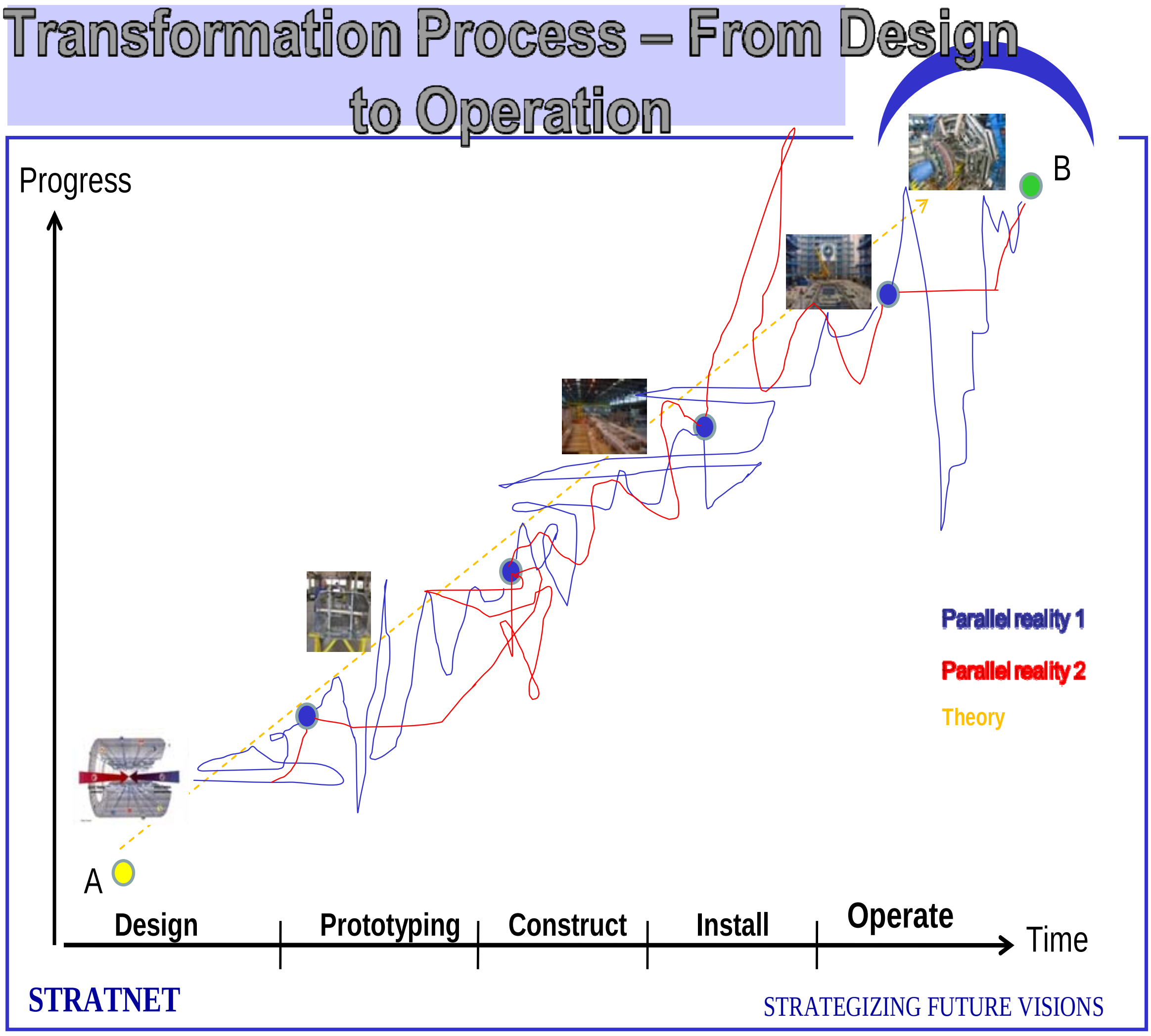
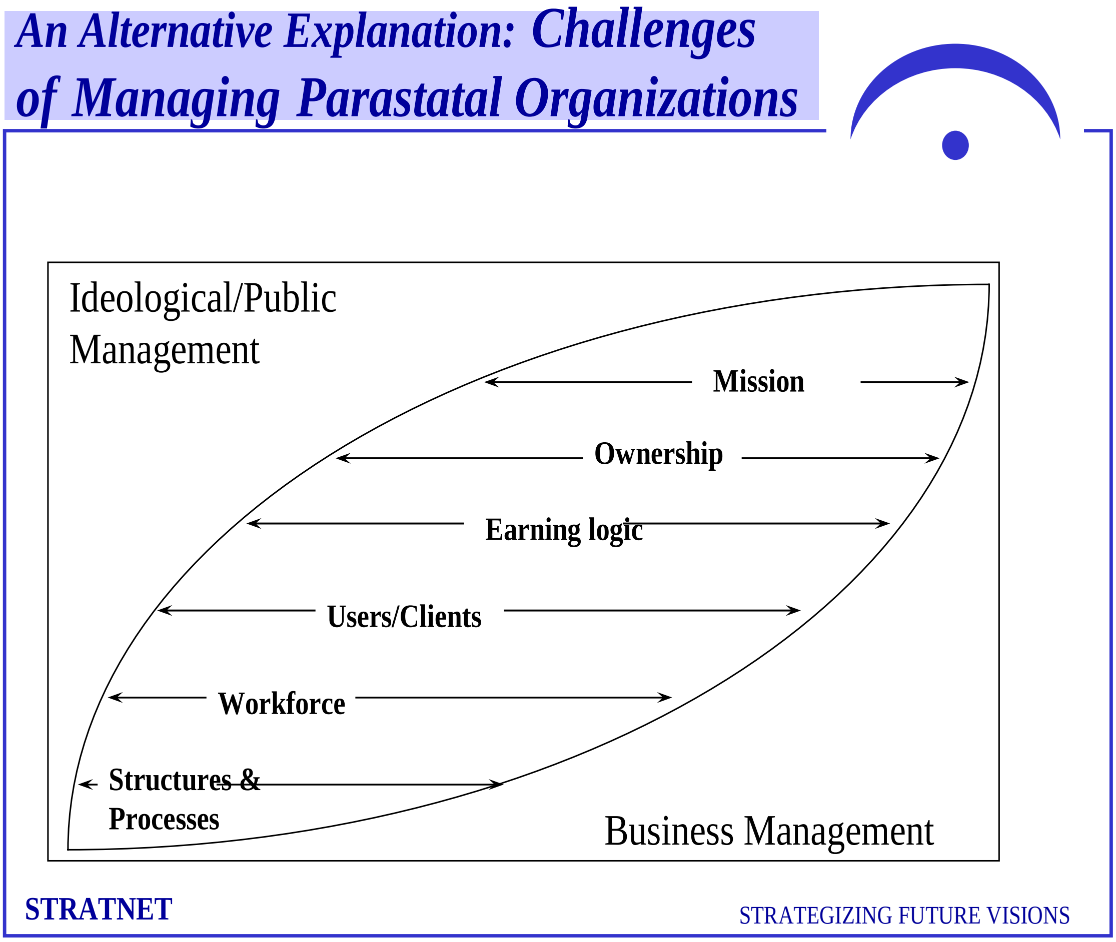


FIGURE 1


An Alternative Explanation: Challenges of Managing Parastatal Organizations
Ideological/Public Management
Mission
Ownership
Earning logic
Users/Clients
Workforce
Structures & Processes
Business Management
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STRATEGIZING FUTURE VISIONS

FIGURE 2