

The Use of Knowledge in Projects: A Discourse on Planning^{1, 2}

Deepak Shrikant, PMP, P.E.

ABSTRACT

In the Nuclear Power Industry regulations are delineated, the standards are explicit, the engineering processes are mature and tested, and organizations are trained to adhere to rules of engagement and the Industry mandates a culture of sharing historical experience to help avoid the pitfalls experienced by others. The rigor, the discipline, the sharing of experience, and learning from mistakes should all lead to better planning and execution. However, this does not hold true. The problem is one of knowing what knowledge a team needs to plan a successful project and how to acquire it from the marketplace.

F. A. von Hayek, the renowned economist, contemplated on the fullest use of knowledge in the planning of economic activities in society and in 1945 published his paper on the subject titled “The Use of Knowledge in Society”¹ Hayek postulates that in the marketplace, people, through the facilities of communication available to them, come to the resolution of concerns with the formation of a rational order which ensures the best use of available knowledge.

This paper examines Hayek’s discourse on the use of knowledge in society and explains how projects can benefit from it by the creation of a rational order through storyboarding. It presents a methodology for storyboarding that can capture the very essence of Hayek’s inquiry into planning through six key elements. It also deliberates Hayek’s postulations and points to examples of success and failures in projects including the work by other scholars who have contributed to the management of knowledge in the Industry as it lays the groundwork for Storyboarding.

INTRODUCTION

Hayek’s discourse on the subject of knowledge dispersement, accumulation and application in society lays the groundwork to planning of complex endeavors in the marketplace. Projects are

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essentially the coming together of people with different perspectives whose inputs guide the planning process. Hayek's postulations as they apply to planned and focussed activities undertaken by organizations is key to understanding how people build narratives that lead to action. The process of building and knitting narratives together requires an understanding of all of the elements that Hayek alludes to, along with the nurturing of a thought process that seeks out knowledge. The six essential elements of Hayek's observations and postulations that need to be understood and embraced to create the narratives that build the story of the project are:

1. The rational order
2. Use of facilities of communications
3. Dispersed Nature of Knowledge
4. Habits of Thought
5. Man on the Spot
6. The price system

A grounding in Hayek's discourse is an essential beginning to storyboarding. The arguments presented herein substantiate Hayek's postulations as it chalks out an approach and methodology to storyboarding of projects.

THE PROBLEM

Creating a Rational Order

A rational order comprises of people, process, knowledge and technologies available in the marketplace and relevant to the planning effort. Planning requires the selection of people who understand the flow of information and communication of knowledge in complex networks of people in the Industry and marketplace. This requires the construction of an organization that understands the creation of the "Rational Order" to harness the knowledge to support the initiative.

The problem of constructing a rational order to undertake the planning and execution of a project is complicated by the fact that the knowledge of all the circumstances a plan must accommodate does not exist in a concentrated or integrated form. This knowledge exists as dispersed bits of incomplete and frequently contradictory information in individuals who may or may not be part of the organization of people planning and executing the activities. The ways in which knowledge is conveyed to the planners and the process through which it is used is one of the crucial problems.

Hayek's discourse on planning provides projects with multiple approaches. Should this planning be done centrally by one authority for the whole project or should it be decentralized and performed by many individuals. Yet another form is one where certain planning is delegated to organized

groups where the narrative of these organized groups supports only part of the narrative and are removed from the objectives of the central plan. Which of these systems is more efficient and appropriate depends solely on which of them makes fuller use of knowledge. Project managers should be aware of the bias that exists within organizations that all that is needed is known and what is known is understood by the organization. Not knowing what one does not know is at the root of such problems where the rational order created does not capture the knowledge required.

The Use of Facilities of Communication

Hayek postulated that people somehow through the facilities of communication available to them find ways to efficiently or inefficiently arrive at resolutions to their concerns. Projects bring about the organization of knowledge, skill, process, tools, technology, and materials in specific horizons of time. They exist in an environment within a social structure with pre-established behavioral norms and for a purpose to yield economic returns in pre-determined time frames. Hayek's enquiry into how planning is conducted through the emergence of a rational order opens the door to creating one. Planners can build the story through a set of questions relevant to the planning of projects. The clear focus would be the two key elements of the rational order; people and communication structures. An enquiry initiated by a set of questions focused on the objectives of the project would help in the creation of a rational order.

1. How do we know what is required and who is to define it?
2. How do we acquire all the relevant knowledge required?
3. How is this knowledge communicated and used in planning?
4. How is this planning to be done?
5. How does one measure the effectiveness of such planning?
6. How is the final outcome determined?
7. How are we to organize to formulate a plan that captures possible and relevant responses to these questions?

Developing responses to these questions requires an understanding of how knowledge feeds planning. Projects very often fall prey to the assumption that people's knowledge corresponds with the objective facts of the situation. The shortcomings in people's knowledge is not evident unless probed. This creates a need for a process by which knowledge is consistently communicated and acquired. The arbitrarily scattered and imprecise nature of knowledge in the marketplace, the everchanging social fabric and the facilities of communication within social networks contribute to this burden of planning projects. The communication of knowledge to the planners of the project can only occur if the existence of people with special knowledge is known to the planners. The central planners are occupied with creating a plan focused on the strategic objectives whereas those with special knowledge are occupied with specific problems and possible solutions. This

difference in focus can make communication of such information difficult, thereby limiting its inclusion in the planning process. Knowledge of social interactions in the marketplace and in Industry are vital to the acquisition of practical knowledge.

Dispersed Nature of Knowledge

We speak about knowledge as if it is structured and available to everyone. The contrary is true and assimilating knowledge relevant to the project being planned requires an understanding of what constitutes knowledge and how it resides within people who make up the marketplace. Scientific knowledge, supported by scientific and engineering principles, occupies such a prominent place in people's minds that the relevance of other kinds of knowledge are quite often ignored. There is a body of very important but unorganized knowledge which cannot be called scientific and which has a bearing on all planning and execution. The knowledge of particular circumstances, of time and place, of observations of the marketplace and of failure and success that reside within people are vital to both planning and execution. Knowledge of market economics, global demand and supply, competition, trade policies, environmental issues, cultural changes, political changes, immigration policies, skilled labor availability, transportation and logistics, contractual issues etc. may play a very important role and yet there may be other areas such as knowledge of circumstances and situations which may never surface until forced by events. Knowledge of communications and other relevant areas is not just ignored but is considered inferior to the knowledge of scientific facts and figures. This prejudice has to a great extent affected the attitude towards commercial aspects of planning in general.

A good example of non-scientific knowledge is Housekeeping. Japanese companies adopted Hiroyuki Hirano's 5S Housekeeping process² (Sort, Set in Order, Shine, Standardize, and Sustain) to introduce a structured thought process within the company in developing and integrating housekeeping processes and technologies into economic activities to yield improvements in quality and costs. The process employed a very different kind of knowledge which until its introduction was not understood but was assumed to be common knowledge. Yet another example is how Knowledge of the commodity markets allowed one utility to hedge on the price of copper and steel used in the manufacture of large transformers. The treatment of a technical procurement as an economic activity resulted in the application of commercial and market knowledge to procurement planning, which yielded savings by timing the purchase of the metals to price drops.

About Tacit and Explicit Knowledge

Practical knowledge may be explicit and made available to the planners but some of it resides in people and described in knowledge management terms as "Tacit Knowledge". Knowledge acquired from individuals is never in the form that is readily usable for planning projects. This is

best described by Ikujiro Nonaka in “The Knowledge Creating Company”³ where he defines the creation of new knowledge through interactions between those that possess the knowledge and those that transact for it and use it. Project managers should be aware of the four basic interactions that lead to the creation of knowledge required for planning - From Tacit to Tacit, From Explicit to Explicit, from Explicit to Tacit and from Tacit to Explicit. Each one of these interactions are essentially transactions where there are offers, acceptance, rejection, modification, acknowledgement, and agreement in structured environments designed to seed, invoke and stimulate thought and analysis to create new knowledge.

The Habits of Thought

Hayek postulated that use of available knowledge in society stems from habits of thought cultivated over years and is deeply rooted in the culture and traditions of organizations. This holds true for organizations that plan and execute projects. Habits of thought are part of our past, our education, our culture and our experiences. Most managers rely heavily on experience and on their own organization for knowledge relevant to their projects. The tendency driven by habits of thought has led managers to accept only those plans that are understood by their organization and ignore the existence of other forms of knowledge in the marketplace. Rather than seeking responses to the questions relevant to the project in its specific horizon of time and space, managers find it convenient to pick solutions based on previous successful implementations. This would be analogous to a football team pursuing a game plan from a previous victory and expecting a similar result. The habits of thought that have been cultivated in Industry to deal with the natural evolution of knowledge in the marketplace require organizations to bridge the chasm between experience and new knowledge.

A fallacy that is embedded in these habits of thought is that practical knowledge of the marketplace and of circumstances and situations is readily available and at the command of everyone. There is also an assumption that success by others can be replicated. Replicating the past has its flaws. Some obvious ones are - the experience of organizations with similar skills but different people have different levels of competency and capability, lessons from previous execution were at a different time and place, the pricing structure in the marketplace is different, obsolescence of methods and technologies alter the conditions of satisfaction, new methods and approaches embraced by the Industry alter outcomes, new regulations challenge the criteria for acceptance, and loss of critical knowledge and skill due to attrition creates voids which are difficult to overcome.

Most assessments focus on lessons from mistakes made and do not evaluate the causes for success. The reasons for success are embedded in planning and in organization of people - some who have

very little to do with the project. In example, the expeditor of a shipment who helps meet the schedule uses new knowledge in the marketplace to move goods and services and is oblivious to what the project is trying to accomplish – the man on the spot. The difficulty lies in the fact that project execution seldom documents the reasons for success or the method by which knowledge was communicated to all the members of the project team.

Man on the Spot

The small changes that occur during the execution of a project and the adjustments made to overcome cost increases during the execution of activities and tasks have a significant bearing on the outcome. The actions to counter the changes require the kind of knowledge that is neither scientific nor are they explicitly laid out in the plan or any other document. This knowledge in people may never surface unless a situation occurs where the circumstances, when defined, triggers its extraction. Logic dictates that ultimate decisions be left to those who are familiar with the circumstances and who know what resources they need to bring to bear at that point in time. The dynamic nature of such problems and the knowledge required to solve them resides several layers removed from the central authority which controls the scope and changes. Hayek defined this as the “Man on the Spot”. The man on the spot is familiar with the situation and the circumstance and has intimate knowledge of the facts of the immediate surrounding but does not possess the ability to assess the entire situation. Communicating this knowledge of circumstances to the central authority to arrive at a solution is precisely where organizations designed to control projects through processes fail to grasp the nature of this predicament.

An example that illustrates this problem is when a new transformer at a power plant tripped during startup. The outside consultant - "Man on the Spot" concluded that the condition that had caused the trip was now no longer present. The plant continued with the process and the transformer successfully went online. The consultant reached his conclusion from previous experience and knowledge. The loss of revenue from not being able to go online and transmit the generated power would have been very difficult to accept and explain.

The Price System

One area of knowledge that is both dynamic and unpredictable is the price system in the marketplace. According to F. A. Hayek - No other knowledge influences the formation of a rational order in the marketplace other than the price system. The price system communicates information that forms the basis for action by individuals in the marketplace, each with dispersed, subjective, and often contradictory knowledge. The knowledge communicated by the price system drives the coordination of actions in the marketplace.

Quoted prices that are heavily relied upon by projects undergo constant changes in the marketplace. The price system is not a product of human design but human behavior in that it is a response to circumstances and conditions and is speculative in nature. It is a product of social interactions in the marketplace where very little thought is given to the circumstances encountered and responses are driven by learned human behavior that reflects the practices which evolved over years of human existence and which have proven to be successful in the past. The pricing system establishes the true value of what is gained and what is lost or in short, the variance from the planned costs.

The Price System helps us dispense with the need for conscious control and move to providing the necessary inducements to individuals to do the desirable things without anyone pointing them to what to do. Inducements trigger the use of special knowledge of circumstance and produce the required outcomes without any involvement from those creating the inducements. The design of contracting strategies to recognize and respond to the price system and to the change in states in the marketplace are critical to projects. The creative design of inducements to stimulate innovation depends on the planners and reflects the effectiveness of the rational order constructed. This is one area that is beyond the control of every project manager who need to be aware of the fact that plans that rely on past performance may not fully understand the circumstances underlying the favorable pricing at that time.

THE SOLUTION

Creating a Rational Order for Projects

The success of the projects depends on how they are organized and structured to extract from the marketplace the requisite knowledge through all the situations and circumstances from inception to completion. The rational order is not clearly obvious until one embarks on defining it. It is this recognition and creation of the rational order that has been the root of success experienced by those planning complex long-term economic endeavors. These may appear to be abstract concepts but as a project begins to embark on specifics, the nature and form of the order appears in the organization of people who in many ways are not even aware of the goals of the endeavor. It is this organization that helps build a powerful storyboard. The process of building this story entails the following:

1. *Building the project team*
2. *Designing Conversations*
3. *Capturing the Elements of Storyboarding*
4. *Managing Risk*
5. *Creating the Story*

Building the Project Team

An essential part of the story is about building the project team. The objective of a Project is to build an organization with the structure essential to planning that ensures the full use of knowledge available in the marketplace. This may be as simple as an organization of people in a single community to a network of knowledge sources interwoven into a complex mesh which one needs to sort through to harness that which is relevant to planning. The natural tendency is to seek experience and not to enquire about knowledge. The term experience has been used to respond to queries about knowledge and to pacify the anxieties of management. The right kind of experience is relevant, and the knowledge brought to bear from such experience is vital. However, it is important to understand what experience means.

Knowledge from experience may be biased in that it only reflects the ability of the organization and not what was then available in the marketplace. It does not indicate if the experience made full use of the knowledge available in the marketplace or the Industry. In the case of projects, the selection of a few members of a previously successful team to replicate performance of a dismantled team is at the heart of this problem. Projects that assume that their organizations possess the knowledge required to navigate through all the circumstances that they may encounter do so at a very serious risk. They blind themselves to the existence of gaps in knowledge within their organization which contributes to a failure of comprehension of situations and circumstances that the project needs to overcome which eventually leads to cost overruns. This has been proven time and again in many a project.

The primary role of management is to recognize that a project conceived in a marketplace has to draw from it through its own organization and structure. This is analogous to a plant placed in soil which is the source of all nutrients it needs to grow and yield fruit. Botanists who understand the science behind plant growth and yield, recognize the current conditions, future situations and circumstance and put in place mechanisms to overcome threats to the growth of the plant. This is akin to projects undertaken by entities. Allowing the creation of communication structures that extend beyond the organizational structure of the entity into the marketplace in which the project has to be planned and executed is essential to reaching the conditions of satisfaction sought by management.

Designing Conversations

The acquisition of knowledge from social environments in a structured form explicit enough for use in planning is a subject partially addressed by Hirano through his introduction to Housekeeping as a topic of conversation. Hirano recognized the importance of conversations designed to create,

innovate and act. A key element that is critical to all economic activity is the design of conversations around planning. As all actions are designed from narratives constructed from conversations it is important to delve into the ontology of conversational structures. Conversations in social environments create narratives which formulate the basis for action. The design of actions is yet again initiated in conversation driven by thought applied to the narrative. Thoughts are initiated by Information and the analytical ability of the members of social environments. Information has context, history, background, relevance to past and future action, linked to already existing practices, trends and behavioral norms. Processing information within all complex structures is accomplished by linking knowledge fragments to form explicit inputs to narratives. This linking is accomplished by the sharing of thought through conversations in a structured environment designed to align with missions and goals. The structured environments are platforms that can be used to establish a cadence for interactive exchange between knowledgeable individuals to design actions. The chronological knitting of narratives from interactions between people lays the foundation to storyboarding.

Capturing the Elements of Storyboarding

Storyboarding is an important tool for planning and visualizing the possible outcomes. It is the creation of the foundation upon which the story is built. Stakeholders can visualize and weigh in on interim states and outcomes as well as identify risks posed by future conditions not considered. A time-lapsed depiction of a scaled model provides the project team with a view into the problems and efficiencies of execution. There is more than one way to create a storyboard and the most effective are the ones that use a combination of narrative, images and virtual reality software. Effective storyboards written in a clear, concise and readable style make for easy comprehension and lead to better engagement of the readers.

All storyboards are defined in a chronology and have a beginning and ending. They are initiated at a specific time and grounded in the current state of the marketplace. Current states are a product of the past and reflect the successful or unsuccessful execution of plans which made full or partial use of available knowledge. Predictions of the future based on current states require an understanding of the marketplace and a recognition of the plans already in motion to alter the current states. Projects have to contend with the prediction of states in the form of risk. Knowledge to understand, transfer, and mitigate the risks is crucial to the success of the project and should be captured in the storyboard.

Managing Risk

The story of managing risk is an essential part of a story board. Projects are created as objectives and the identification of risks that can drive variability in performance is left to the project managers. The problem with risk management is that it is dominated by lessons learned from the past. The reliance on the past blinds' projects to the current conditions in the marketplace and the situations and circumstances that may have to be dealt with in the future. Knowledge required to address the situations and circumstances of the current and future market states reside within people who may not be within the project's organization. The awareness of this reality is crucial to planning the mitigation of the risks identified.

The nature of human beings to innovate produces new circumstances and adds to new problems and demands new solutions. There are no good answers to any of the circumstances and situations caused by innovation. Organizations that partake in discourses and deliberations about the new conditions are better equipped to address the needs arising from the new events. The key is to acquire the knowledge to build organizations with vigilance and intelligence to address the strategic risks faced by the entity in the marketplace by developing the stories about risk.

Creating the Story

A project is the story about how an organization tasked with accomplishing the strategic objective puts together an actionable plan. The story is about how individuals and organizations interact and transact with each other to develop the narrative which is the plan. The manner in which a project creates the interactions and the design of conversations are essential parts of the story. Management is tasked with pulling together all the knowledge required to plan the endeavor and to develop the story that can be narrated to the project team and the stake holders. This is one of the most difficult aspects of planning.

The three essential ingredients to building a story are Information, knowledge and communication structures in the marketplace. A fundamental understanding of these elements leads to an inquiry that fuels the narrative. The knitting of the narratives requires knowledge of situations and circumstances that may be encountered. Storyboarding is the process through which a well-thought-out plan emerges from an effort that focuses on pre-planning. The organization and structure of the endeavor begins to emerge from this effort and the plan begins to take shape. The integration of the project's objectives with the market forces become evident and the issues, constraints, future situations and circumstances are identified and acknowledged. The creation of powerful narratives requires projects to recognize the value of storyboarding –building narratives from transactions of knowledge and information.

CONCLUSION

Projects are stories about how organizations put together an actionable plan and execute it. The stories are about individuals interacting and transacting with each other to develop the narrative, which is the plan. The sourcing of knowledge required to support the narrative and address the situations and circumstances leads to identification of individuals and organizations that make up the rational order. The contribution of all the individuals who have a role to play in the story help develop the narratives. The knitting of the narratives with knowledge of current and future states builds the storyboard for the project.

Performance measurements of storyboarded projects are more reliable and provide for opportunities to introduce corrections to the narratives with new knowledge or with experts who can swing the outcome in the project's favor as in "Man on the Spot". As states change so should the narratives and the project plans. Narratives that contain the basis and knowledge sources behind the planned actions including the situations and circumstances lay the groundwork for change. The rational order that emerges from the narratives plays a critical role in determining new courses that projects embark on as states change. The narratives are as much about the creation of the narrative as they are about the content of the narrative. It is about the fragments of knowledge dispersed among people within and outside the entity planning the endeavor, it is about the state of the marketplace, it is about the situation and circumstances of the future and its causes, it is about strategic and operational risks, it is about the design of conversations and communication structures, it is about plots and sub plots, it is about the environment, it is about chronologies, it is about uncertainties and certainties as well as possibilities, and above all within each narrative it captures the states of knowledge, past, current and the future.

The purpose of a well-knit story is to stimulate minds to remain vigilant to changing states. This vigilance ensures sourcing of the required knowledge to overcome concerns and to mitigate risks posed by situations and circumstances. The power of narratives helps define the rational order that ensures the fullest use of knowledge and helps build the story to success. The most important aspect is the ability of storyboarding to capture the imagination of people within and outside the organization through narratives. The story can be made available to other organizations which can with its own knowledge modify it and blend it into their story. These stories speak to those who seek to understand and build a rational order from the marketplace. All narratives are relevant but the ones which make fuller use of knowledge are more powerful than the ones that don't.

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About the Author



Deepak Shrikant

Illinois, USA



Deepak Shrikant has served in the Nuclear Power Plant Industry for over thirty five years and is currently a Senior Project Manager responsible for large Capital Projects at Exelon Nuclear Generation Company. He was previously the Director of Major Projects at Invensys/Schneider Electric where he was responsible for the delivery of large projects in China, Korea, Canada and the US. In his professional career he has held responsible positions in Corporate Governance, Program and Project Management, Engineering & Construction Management, Business Development, Risk Management and Revenue Stream/Cost Management of Capital Projects. His focus over the last ten years has been on planning large and complex endeavors and developing knowledge-centric approaches to planning. He can be contacted at deepak.shrikant@exeloncorp.com