

# **Toward a Fundamental Differentiation between Project Types**

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## **Abstract**

Some project management styles and techniques work well on some projects — not on others. Is there some fundamental differentiation that, if understood, could enable adoption of a successful management style for a given type of project? A simple 2x2 matrix is proposed which the authors believe opens the gateway to such selection.

## **Introduction**

If they think about it at all, most people think of a project as something to be completed and not about the best way to manage it. The student thinks of an assignment that must be finished and handed in to his or her tutor. The programmer thinks of a finished software application that must be ready for a client or for sale in the marketplace. The builder thinks of the building that must be completed in time for some one's move-in date. Few give thought to the type of project it is, they simply do it the way they have always done it.

As projects get larger and more complex, they need to be better managed and modern project management has been developed for the purpose. There are many tools and techniques that can be applied to the management of a project, but there is still plenty of evidence of a low rate of success. Projects are completed late. Others run over budget. Still others are on time and on budget but yet are not considered successful. This is either because the product is not what it was supposed to be, or because it was not what was needed.

Is it because these project management tools and techniques have not been applied correctly or forcefully? Or, perhaps, the wrong tools and techniques have been applied? Why is it that some techniques work well on some projects and not on others?

If that is the case, is it possible to look beyond the immediate shortcomings for some other pivotal dimensions? Dimensions that, if better understood, would enable better management selection, more appropriate management styles, and higher rates of project success? We believe so.

## **Purpose of Paper**

Projects are processes for conducting work that produces a new product of one sort or another. The better we can understand these processes, the better we should be able to educate project managers and their teams. The better educated the project managers and their teams that we have, the higher the project success rating we should be able to achieve. For this, we need to know how these processes may be linked to a particular type of product, and

what the implications are for project management.

To commence this journey, we need a suitable basis for classifying projects. To this end, we believe that it is necessary to look beyond a project's nominal category or sponsoring industry and look at the fundamentally different types of work involved. Most projects encompass more than one type of work, so we must look at the major work elements (work packages) and their immediate products.

Our basic premise is simple - ***For a project to be successful, different types of project work, associated with different types of product, need to be managed differently.***

In other words, management style, strategy, tools, processes and people should all be adapted to the specific type of project. The purpose of this paper, then, is to identify fundamentally different types of project from the perspective of selecting appropriate styles of management.

## **Background**

Historically, projects are differentiated according to the industry to which they belong, e.g. construction, various types of services, resource industries, manufacturing, and so on. Each tends to be seen as different, if only because each develops its own industry terminology and communication across industries becomes difficult and misleading. On other occasions projects are differentiated by size or by organizational structure or by the functional relationships involved.

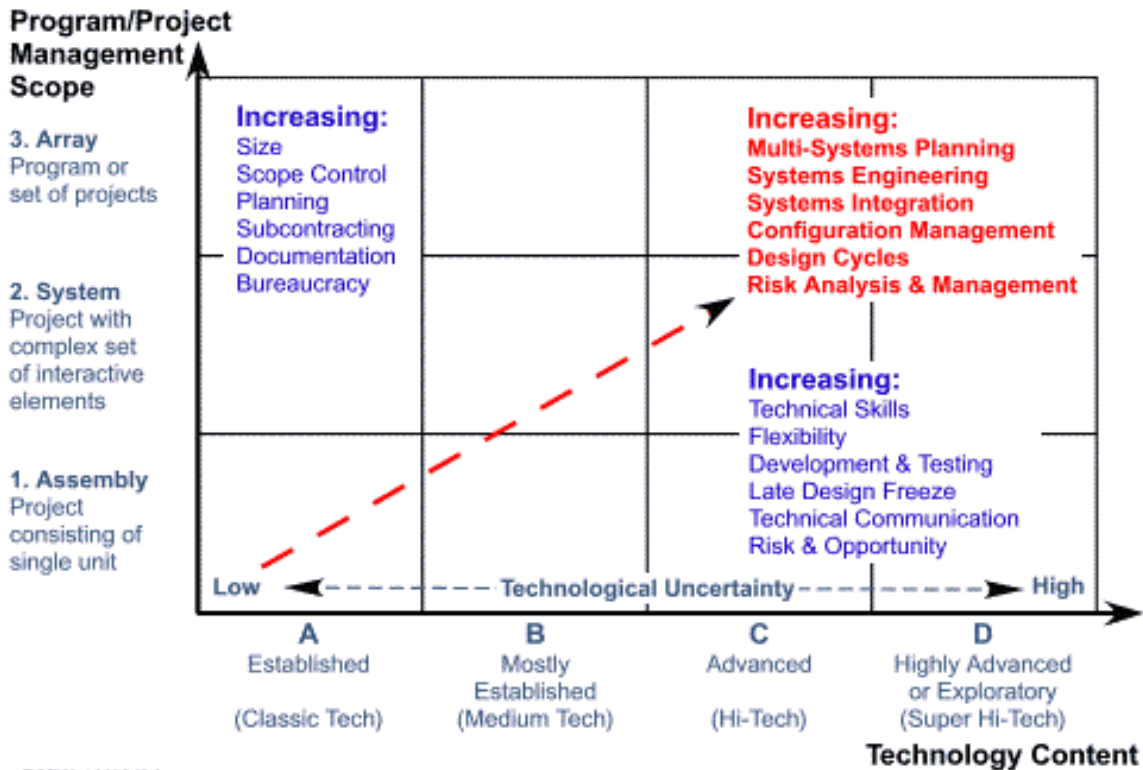
Several project typologies have been suggested to address the differences among projects. Traditionally, such typologies were based on the classical distinction between radical and incremental innovation [1]. For example, Blake [2] suggested a normative distinction between minor change (alpha) projects and major change (beta) projects, and Wheelwright and Clark [3] have mapped projects according to the degree of change they introduce within the company's product portfolio. Their typology includes derivative, platform, breakthrough, and Research & Development Projects. Pearson [4] and Steele [5] offered other typologies.

In a recent research effort, Shenhar [6] and Shenhar and Dvir [7] have proposed a matrix consisting of four project categories based on levels of Technological Uncertainty, set against three levels of Project Management Scope based on level of project management complexity. This arrangement is briefly summarized in a 1996 Shenhar and Wideman paper [8] and is illustrated in Figure 1. This matrix is invaluable in alerting management to the relative risks of different levels of technology in the project and the intensity of project management required.

Looking further, however, one needs to break the project into different work packages to identify specific styles of work on different project components.

## **The Nature of the Product**

The first indication of a potential project is in the expression of a need to be fulfilled, an opportunity to be captured, or even a crisis to be averted or mitigated. If it is determined that a project should therefore be undertaken, initial planning centers around gaining an understanding of the nature and extent of the ***product*** of this effort.



**Figure 1 - Proposed Project Typology**

More often than not, the result of this effort is some form of tangible artifact, and examples include such items as new physical plant, infrastructure, or new product such as an automobile or appliance. Based on these types of product, we may label the project as **tangible**.

However, the underlying purpose of any project is to add value in some way. This value may well be vested in the tangible artifact itself, as in the examples quoted. On the other hand, the real value of the project's product may not be in the physical artifact but in its **intellectual property** value. Some examples include software, a new system, administrative plan, reorganization, book, poem and so on. Based on these types of product, we may label the project as **intangible**.

We may now arrive at the following definitions.

**A. "Tangible" Product**

A tangible product is one in which the primary value is in the physical artifact. It is the value of the artifact that distinguishes it from other products. A new building is a well-recognized example of this type of product.

**B. "Intangible" Product**

An intangible product is one in which the value is in its intellectual property. Although there is some physical result, this is not the essence of the product. The essential feature is new information and its physical aspect is only a vehicle for its conveyance and transformation. Software is a prime example.

## The Nature of the Work Involved

Our goal is to arrive at a basic differentiation between projects from the perspective of applying different management strategies. Since management is about exercising influence over people, we need to know about the people working on the project. They, in turn, will be selected for their abilities to perform the required work. Hence, we need to focus on the major elements of the work involved to complete the project.

In the case of a new building (Tangible Project) it is not too difficult to conceive of the bulk of the work being done by workers belonging to recognized trades. That is, they have **craft** skills, with the ability to undertake reliable repetition. These skills are acquired by **training**, even though it may be through on-the-job experience.

Similarly, in the case of creating new software (Intangible Project) it is clear that the types of workers required are those with **intellectual** skills, such as programming. It is true that experience and training are involved, but **education** is a prerequisite to being able to understand problem solving, grapple with complex relationships, and devise new arrangements through iteration.

Therefore, we define craft and intellect work as follows.

### A. Craft Work

Craftwork is work that has been done before, essentially requiring repetitive effort. It is an activity that fundamentally repeats a previous activity, can be improved through repetition, and conforms to the learning curve phenomena.

Such work is the result of manual dexterity. Examples might be concrete forming, assembling a chair, repairing a car and so on.

### B. Intellect Work

Intellect work is work that requires substantial creative effort. It has not been done before, is exploratory in nature, and will likely require iteration. It requires new ideas and imagination. Such work is the result of applying **brainpower**. Examples include developing a new theory, new process, new invention and so on.

It may be argued that all projects involve intellectual work in their planning and for this reason all project management is essentially the same. Indeed, this may be a popular misconception with many. However, it is the work in the implementation phases of the project that results in the ultimate product. It is this that distinguishes one type of project from another - and is the focus of our interest here.

## Putting Together a Matrix

At first glance it may appear that craftwork is simply the requirement of tangible projects, and intellect work is the requirement of intangible projects. However, a moment's thought will reveal the possibility of both tangible-intellect projects as well as intangible-craft projects. This 2x2 matrix is shown in Figure 2. The following will provide greater clarity of the differences between the resulting four types of project

<b>Type of Work in the Project</b>	<b>Intellect</b>	<b>Example:</b> Development of an all-new electric car	<b>Example:</b> Development of a new theory
	<b>Craft</b>	<b>Example:</b> Detailing and construction of a building	<b>Example:</b> Updating a procedures manual
		<b>Tangible</b>	<b>Intangible</b>
<b>Type of Product from the Project</b>			

**Figure 2 - Basic 2x2 Project Classification**

### **A. Tangible-Intellect Project**

A tangible project involves the creation and assembly of a new piece of hardware or other material product. It is something that has not been done before. It is typically subject to 'linear logic', but requires iterations to achieve the ultimate goal. These projects may be costly, and the resources required are not very predictable. An example of the Tangible-Intellect project would be the development of an all-new electric car.

### **B. Intangible-Intellect Project**

An intangible-intellect project requires a non-repetitive creative effort to develop new intellectual property, e.g. a new plan or piece of information. No linear logic is involved, but iterations will be needed before satisfactory completion. These projects are probably relatively less costly, but the resources are highly unpredictable simply because brainwork is involved and they have never been done before. An example of an Intangible-Intellect project would be the development of a new theory, or the writing of a book.

### **C. Intangible-Craft Project**

An intangible-craft project does involve the assembly of a physical entity, but the value of the product is in its content, not the article itself. The project likely involves copying and updating from a previous version. There should be no need for iterations, as the previous version should provide the basis for learning. Linear logic is not required and resource requirements are predictable. Examples might be the conduct of the annual plant maintenance shutdown, or the updating of the associated procedures manual.

### **D. Tangible-Craft Project**

A tangible-craft project involves the creation of a physical artifact that results from craftwork that is essentially repetitive in nature. The work is subject to linear logic, and learning curves in the pursuit of satisfactory productivity in the building of the artifact. These projects are usually costly, but the resources are predictable and controllable.

Although mock-ups may be entertained to facilitate planning, iterations are not required. In fact 'iterations' are viewed as unproductive and undesirable 're-work'. Examples of a Tangible-Craft project would be the detailing and construction of a building, or the nominal changes to last year's gasoline car for this year's 'latest model'. Figure 3 summarizes these characteristics for each type of project in the matrix.

<b>Type of Work in the Project</b>  Intellect (Requires education)       Craft (Requires training)	<p><b>Characteristic:</b></p> <ul style="list-style-type: none"> <li>- Not done before</li> <li>- Subject to linear logic</li> <li>- Requires iterations</li> <li>- Resources less predictable</li> </ul> <p><b>Result:</b> Development of new physical artifact</p> <p><b>Examples:</b> New invention, device; All-new "mouse-trap"; New product from R&amp;D</p>	<p><b>Characteristic:</b></p> <ul style="list-style-type: none"> <li>- non-repetitive, first of its kind</li> <li>- Creative effort</li> <li>- Minimal repetition</li> <li>- Resources unpredictable</li> <li>- Exploratory</li> </ul> <p><b>Result:</b> Development of new piece of intellectual property</p> <p><b>Examples:</b> New book, poem, music, movie, etc; New algorithm, theory, idea; New technology process; New software</p>
	<p><b>Characteristic:</b></p> <ul style="list-style-type: none"> <li>- Much repetitive effort</li> <li>- Linear logic applies</li> <li>- Learning curve effects</li> <li>- Learn by doing</li> <li>- Resources predictable</li> <li>- Relatively high cost involved</li> </ul> <p><b>Result:</b> Typical physical artifact</p> <p><b>Examples:</b> Typical new physical plant, infrastructure, or product, e.g. building; utility; car; appliance</p>	<p><b>Characteristic:</b></p> <ul style="list-style-type: none"> <li>- Based on previous model</li> <li>- No iterations, only corrections</li> <li>- Learn by repetition</li> <li>- Physical format required only for distribution</li> <li>- Resources predictable</li> <li>- Relatively low reproduction cost</li> </ul> <p><b>Result:</b> Typical piece of intellectual property</p> <p><b>Examples:</b> Typical system, software upgrades, etc. Policies, procedures manual; Plan for factory shut-down</p>
<p><b>Tangible</b> (Value is in the entity)</p>		<p><b>Intangible</b> (Value is in the content)</p>
<p><b>Type of Product from the Project</b></p>		

**Figure 3 - Basic Project or Major Project Component Classification**

***How the Matrix might relate to a Spectrum of Management Style***

It is a common experience that different people respond to different styles of leadership, yet there appears to be little agreement on how people should be classified. Typically, they are classified in different ways for specific purposes.

Still, there does seem to be general agreement that some people respond better to being told

what to do, while others respond better when allowed to think more for themselves. Intuitively, one suspects that the former aligns more with craftwork by way of training. The latter aligns more with intellectual work where people have more opportunity to educate themselves. These differences are readily brought to mind by comparing the differences in management required for, say, a software project and a construction project. This relationship is the subject of a subsequent paper.

## **Conclusion**

The purpose of this paper has been to establish fundamentally different types of project tasks with a view to subsequent correlation with different styles of management. The objective of this correlation would be to increase the proportion of successful projects experienced.

Every project is composed of a range of activities or tasks. To achieve a project's objective, many tasks are often accomplished as separate work packages or elements and then integrated into the final product. The exact nature of an element depends on the mixture and type of the contained tasks. To gain insight into the type of project, it is necessary to look within the project to its major work elements. These elements may then be examined to ascertain the best form of management most likely to lead to a successful outcome.

The nature of these work elements can be distinguished according to two scales: type of end product and type of activity (work done) to produce that end product. There are two fundamental types of product: tangible and intangible; and two fundamental types of work (effort): craft and intellect. These two dimensions form a simple 2x2 matrix in which four essentially different types of project can be found. These are Tangible-Intellect; Intangible-Intellect; Intangible-Craft; and Tangible-Craft.

The paper describes each of these four types and their typical characteristics. Intuitively, one suspects that people involved in craftwork respond better to being told what to do, while those involved in intellectual work expect to be allowed to think for themselves. This topic will be examined in a later paper.

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