

**Series on project integration, interfaces and
context management¹**

Article 2 of 3

Project interfaces and their management

By Alan Stretton

INTRODUCTION

This series of three articles is concerned with project integration. The first article (Stretton 2016h) was essentially an overview of the literature on project integration per se. In spite of its perceived importance to project management, materials specific to the subject are somewhat scarce, fragmented, and disparate, and do not provide good insights about the essential elements of project integration.

The first article noted that many authors strongly associate project integration with project interfaces and their management, and signalled that this second article will look at the rather modest materials on project interface management in more detail (which hopefully may provide further insights about project integration at large). It will be found that different authors have different perceptions of the nature of project interfaces, and of which they see as the important ones. Over thirty project interfaces are identified, and are broadly classified and accumulated into a table. This could be seen as a basic checklist for project managers who are establishing and/or managing this component of project integration. It also provides a listing of project contexts which are relevant to the third article of this series.

LINKS BETWEEN PROJECT INTEGRATION AND PROJECT INTERFACE MGT

In the first article it was pointed out that many writers link project integration with project interface management. For example, Stuckenbruck 1988 said:

Project managers carry out their function of project integration primarily by carefully managing all of the many diverse interfaces within their projects.

Struen 2011 also links the two very directly:

Need for integration of project processes is evident when interfaces must be established for the processes to interact.

This second article looks in more detail at project interfaces and their management.

¹ Editor's note: This series of articles is by Alan Stretton, PhD (Hon), Life Fellow of AIPM (Australia), a pioneer in the field of professional project management and one of the most widely recognized voices in the practice of program and project management. Long retired, Alan is still accepting some of the most challenging writing assignments; he is a frequent contributor to the *PM World Journal*. See his author profile at end of this article.

THE NATURE OF PROJECT INTERFACES

In the following I draw heavily on just a few authors who appear to have made the biggest contributions in this area.

Healy 1997

Healy 1997:268 describes project interfaces rather succinctly as follows.

An interface is a boundary where an interdependency exists across that boundary and where responsibility for the interdependency changes across that boundary.

Healy goes on to say (p.269) that

Interfaces arise because work is broken down into parts and each of the parts is carried out by or executed by different people or organisations. The definition of the parts may depend on technology, on economics, on geography or a host of other factors. The project manager can also impose interfaces to help in the management of the project.

No matter how the work is divided up, there is always the problem of linking the various parts and so a need for interface management.

Healy 1997:Ch 12 effectively has the following three broad categories of interfaces.

- Interfacing the client
- Maintaining external interfaces
- Managing internal interfaces

Morris 1988

Morris 1988:18 introduces the subject of interfaces from a systems perspective.

During the 1950s, work in economics, psychology, sociology, anthropology and other disciplines developed open-system ideas by elaborating the importance of systems' boundaries and interfaces.

Having introduced interfaces via this systems perspective, Morris goes on to relate this to project management, partly as follows.

The systems perspective has contributed substantially to the development of project management. Firstly, the systems emphasis on viewing a system as a whole has frequently been behind the recognition of the need for an across-the-board integrating role – that is, for project management itself.

Here, Morris has developed a systems approach to directly equate project management with an across-the-board integrating role, and has noted the importance of systems boundaries and interfaces in undertaking this role.

In the context of managing project interfaces, Morris distinguishes between three sets of project subsystems in his Figure 2-3.

- **Project/outside world “static” subsystems.**
- **“Dynamic” interfaces.** . Morris says the “dynamic” interfaces arise “as a function of the pattern of activity interdependencies generated by the way the project develops”. These include interfaces between life-cycle or activity subsystems.
- **Intra-project “static” subsystems.**

We will be looking further at Morris’ subsystems/interfaces later. For the moment we note that he has broadly distinguished between interfaces external to the project, and internal interfaces. He shares this attribute with Healy’s above categorisation.

Stuckenbruck 1988

Stuckenbruck 1988 also broadly classifies project interfaces, but in a different way:

- personal interfaces,
- organisational interfaces, and
- system interfaces.

We now briefly look at what various authors have had to say about the management of project interfaces.

PROJECT INTERFACE MANAGEMENT

Despite its importance in project management, interface management has been given little attention
(Healy 1997: 267)

Healy 1997:268 describes interface management as follows.

Interface management then is the management of the interdependencies and responsibilities across the boundaries of the interface.

Morris 1988 also mentions interdependencies in a systems context. He says that, typically, the activities of subsystems in a project create certain interdependencies:

- technical,
- organizational, and
- environmental

He goes on to observe that these interdependencies may be almost accidental or may be deliberately organized.

Morris also says that interface management identifies the following:

- The subsystems to be managed on a project,
- The principal subsystem interfaces requiring attention,
- The ways in which these interactions should be managed successfully

Archibald 1976 responded to his own question “What is meant by interface management?” as follows.

Interface management consists of identifying, documenting, scheduling, communicating, and monitoring interfaces related to both the product and the project.

Stuckenbruck 1988 says that project integration and interface management are virtually one and the same.

Project integration is just another way of saying interface management since it involves continually monitoring and controlling (i.e. managing) a large number of project interfaces.

I am not sure that we have gained any substantial further insights into project interfaces in this quick survey of what some authors have said about their management. Their descriptors of what is involved are rather mixed.

I therefore propose to look further at types of project interfaces. I found many more different types than I had initially expected, and spent some time trying to work out how best to categorise them. The first broad categorisation that appeared to make sense was to distinguish between interfaces which are external to the project, and internal ones.

A VERY BROAD GROUPING OF PROJECT INTERFACES INTO INTERNAL AND EXTERNAL CATEGORIES

A basic internal / external model

Project interfaces can be broadly categorised into:

- Internal interfaces – i.e. interfaces within the project itself, and
- External interfaces – i.e. interfaces that the project has with external entities.

However, I came across a problem here, which can best be explained by first distinguishing between two types of organizations that undertake projects, which I call production-based organization and project-based organizations.

Distinguishing between production-based and project-based organizations

I follow Cooke-Davies 2002 in describing these two types as production-based and project-based organizations, and borrow from Archibald et al 2012 (who use different descriptors) in defining them:

- **Production-based organizations** derive most (if not all) of their revenue and/or benefits from producing and selling products and services. They utilize projects to create or improve new products and services, enter new markets, or otherwise improve or change their organizations.
- **Project-based organizations** derive most (if not all) of their revenue and/or other benefits from creating and delivering projects.

In the case of project-based organizations, we can clearly differentiate between internal project interfaces on the one hand, and interfaces with the project's external environment on the other. But it is a bit more complicated in production-based organizations.

Two types of external interfaces in production-based organizations

In the case of production-based organizations, there are two external environments with which the project interfaces. One is that of the production-based organization itself. Within such organizations, projects are generally (although not always) undertaken in a matrix organizational format. I have therefore described this interfacing as "Interfaces with the rest of the (matrix) organization".

But the production-based organization itself has a wider external environment, with which it and its projects also interface. I have described this as "Interfaces with the project's (wider) external environment".

Two basic project interface models: For project-based and production-based organizations

We can represent the above situation with the following two models, one for project-based organisations, and the other for production-based organisations.

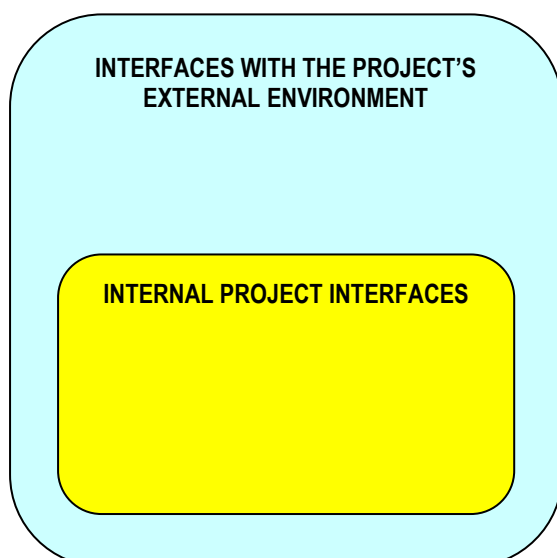


Figure 2-1: Two primary categories of project interfaces for project-based organizations

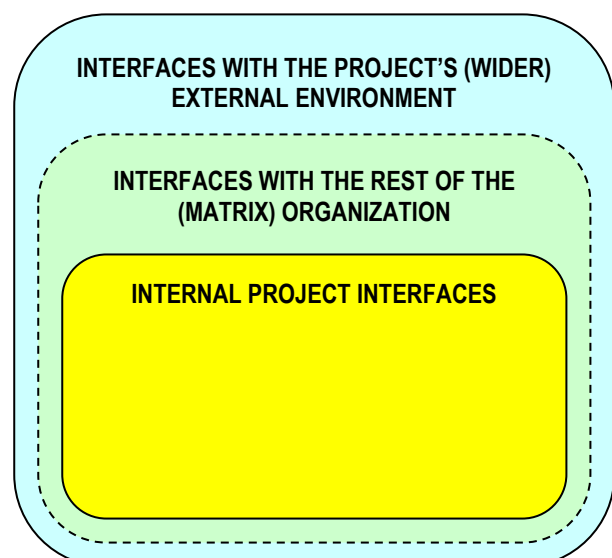


Figure 2-2: Three primary categories of project interfaces for production-based organizations

We start by looking at what various authors have included in the category of interfaces with the project's (wider) external environment.

INTERFACES WITH THE PROJECT'S (WIDER) EXTERNAL ENVIRONMENT

Morris 1988: Figure 2-2 has rather a comprehensive list of what he calls "outside world" entities with which projects may interface. These are interfaces with

- Government
- Economic climate
- Finance
- Community groups
- Media
- Regulatory agencies
- Competitors
- Suppliers (subcontractors, consultants)
- Owner (customer, client)

Interfacing with suppliers is shared with other authors, including Stuckenbruck 1988, who includes subcontractors in this category. Others (for example Tasmanian Government 2004) have included consultants in this category. Extending this even further, APM 2012 specifically proposes an extended version of what might possibly be included in the suppliers group, but which I have categorised separately as

- Interfaces with other disciplines

APM 2012 specifically includes accounting, health and safety, human resource management, law, security, and sustainability in these other disciplines. In some instances one or more of these might be internal to the project. However, more normally they would be external to it, either in the parent organisation, or in the wider external environment.

With regard to interfacing with the owner, in production-based organisations, the owner may often be within the (matrix) organisation. Archibald 1976 and Stuckenbruck 1988 both include customer and customer or client interfaces. For the sake of this article I have added these to the owner interface.

Dinsmore & Cudas 2010 have a special concern, notably on international projects;

- Cultural interfaces

Once again, these could well be of concern internally on projects, but Dinsmore & Cudas tend to focus on cultural interfaces external to the project.

The above external interfaces have not included other external stakeholders beyond owners/customers/clients, and those initially listed above. It has been well documented how such stakeholders, particularly adversarial ones, can influence projects, and the desirability/ necessity for the project to interface (engage) with them

for all the obvious reasons. I am therefore introducing the following as a kind of catch-all to cover potential external interfaces not already covered above.

- Other external stakeholders

INTERFACES WITH THE REST OF THE (MATRIX) ORGANIZATION

We start with some listings from Stuckenbruck 1988, whose Figure 3-2 lists twelve items which he calls the total project system. Nine of these appear to be specifically relevant to interfacing with the rest of the (matrix) organisation. Two other interfaces, namely with suppliers and subcontractors, appear to be external to the production-based organisation, whilst the remaining interface with customer or client, could be internal or external to the organisation. I have added the latter to the following nine items which appear to be specifically relevant to interfacing with the rest of the (matrix) organisation:

- Other projects
- Top management
- Line management
- Line personnel
- Social contacts
- Personnel and training
- Financial system
- Technical support
- Computer programmers
- Customer or client

Most of these would fall under two of Stuckenbruck's three broader classifications listed earlier, namely organisational interfaces, and personal interfaces. The second and third bullet points would also fall into a category which Archibald 1976 calls management interfaces.

We have already noted that, in the context of managing project interfaces, Morris 1988 distinguishes between three sets of project subsystems in his Figure 2-3, the first of which he calls *Project/outside world "static" subsystems*. He says that the principal areas of work at this operational subsystem level are

- Ensuring satisfactory *Project Definition*,
- Preparing for *Operations and Maintenance*,
- Preparing for *Sales and Marketing*,
- Ensuring appropriate *Organization* structures and systems,
- Facilitating arrangements with important *Outside Groups*,
- Ensuring appropriately skilled *Manpower*, and
- Ensuring that the entire enterprise is *Commercially Sound*.

From this we can pick up specific interfaces with *Outside Groups*, which have already been covered in the above section on interfaces with the project's (wider) external environment. However, it also appears that we could add interfaces with two other departments of the production-based organisation as follows:

- Sales and marketing
- Operations and maintenance

INTERNAL PROJECT INTERFACES

Here we have a considerable number of interfaces

Healy 1997:267 identifies the following project interfaces, which are evidently illustrative only, but which are primarily internal to the project (my bullet points).

- **Time interfaces** may be imposed to ensure a certain type of work is finished before another starts;
- **Geographic interfaces** may involve taking work off-site so as to allow other production processes to commence;
- **Technical interfaces** may be imposed to ensure that certain technologies come together; and
- **Social interfaces** may be imposed to keep certain work-groups apart.

Archibald 1976 has a substantial number of project interfaces. The first three appear to be mainly internal interfaces, and are fundamentally task-related.

- **Change of responsibility interfaces** existing when one task is completed and the result is transmitted to another manager for the accomplishment of a following task
- **Information interfaces** existing where information developed in one or more tasks is needed by one or more other tasks in the project
- **Material interfaces** existing where equipment, supplies, facilities, or other physical items must be available at a particular place before the following task can be accomplished

Archibald's next two interfaces appear to relate more appropriately with the rest of the (matrix) organisation, or, in the case of customers, also on occasions with the project's wider external environment.

- **Management interfaces** existing where important managerial decisions, approvals, or other action will impact the project
- **Customer interfaces**, which are similar to managerial interfaces but involve the customer or funding source

Archibald goes on to note that most management milestones for reporting and evaluation purposes are interface events. This is certainly an interface event which is internal to the project, but of a different type. Morris 1988 broadens his description of this type of interface event by calling them

- **Review points**, for example design-freeze points, estimates-to-complete, monthly progress reports (as well as milestones)

Morris 1988 is concerned with what he calls **dynamic interfaces**, which include

- **Major breakpoints in the project life cycle**, as, for instance, between each of the four major phases. Also
- **Major breakpoints between activity subsystems between each phase**, for example between manufacture, inspection, delivery, warehousing, installation and testing.

Morris also says that boundaries should be placed where there are major discontinuities in technology, territory, time, or organisation. Technology boundaries are covered above by Healy’s technical interfaces, territory (arguably) by Healy’s geographic interfaces, and time by Healy’s time interfaces, all of which are internal to the project. Organisation boundaries appear to be covered by one or more of the interfaces listed above in the section on interfaces with the rest of the (matrix) organisation.

Finally, I am adding Stuckenbruck’s **personal interfaces** to this internal interface category, although it would also have relevance for the other two categories.

SUMMARY

Pulling together the above interfaces from the various named sources in the literature, and summarising them (with a few changes in the order of presentation), we have come up with some thirty five types of interfaces in the project context, as shown in Table 2-1. Most of them are different, although many are related.

INTERFACES WITH THE PROJECT'S (WIDER) EXTERNAL ENVIRONMENT	INTERFACES WITH THE REST OF THE (MATRIX) ORGANIZATION	INTERNAL PROJECT INTERFACES
<ul style="list-style-type: none"> ▪ Government ▪ Economic climate ▪ Finance ▪ Community groups ▪ Media ▪ Regulatory agencies ▪ Competitors ▪ Suppliers (subcontractors, consultants) ▪ Other disciplines ▪ Owner (customer, client) ▪ Cultural interfaces ▪ Other external stakeholders 	<p>Organisational interfaces</p> <ul style="list-style-type: none"> ○ Other projects ○ Top management ○ Line management ○ Line personnel ○ Social contacts ○ Personnel and training ○ Financial system ○ Technical support ○ Computer programmers ○ Customer or client ○ Sales and marketing ○ Operations and maintenance 	<ul style="list-style-type: none"> • Major breakpoints in the PLC • Major breakpoints between activity subsystems within phases • Change of responsibility interfaces • Information interfaces • Material interfaces • Time interfaces • Geographic interfaces • Technical interfaces • Social interfaces • Personal interfaces • Review points

Table 2-1: A summary of project interfaces derived from the literature

There is one direct duplication (customers, clients), which I have deliberately included because of their pre-eminent importance in two of our three primary categories. Many other interfaces could have been placed in two, or all three, primary categories – for example cultural, personal and social interfaces. However, in order to keep the listings relatively manageable, I have restricted such nominations to the category for which they appear to have the greatest relevance. It could be said that there are some more indirect duplications, for example with

interfaces with other disciplines and their counterparts in the interfaces with the rest of the organisation category.

However, by and large we have very substantial lists of different interfaces which various authors have identified as being relevant to project management. Of course, this table does not claim to represent all types of project interfaces – these are simply the interfaces I have been able to identify from the literature.

DISCUSSION

A partial checklist for project integration

This second article has been concerned with what most authors regard as a key part of project integration, namely project interfaces and their management.

What has emerged from this article is an accumulation of various types of project interfaces identified from the literature, grouped into three broad categories. This could be seen as essentially a checklist, comprising some thirty five project interfaces, which project managers should be looking to cover in the course of establishing and/or managing this key component of project integration.

Whilst not claiming to be a fully comprehensive checklist, it does appear to be potentially a very useful one.

Project interfaces and project contexts

What strikes one about this listing of project interfaces in Table 2-1 is that so many of them are interfaces with what are commonly described as project contexts – most particularly those interfaces that are external to the project itself. The above table of project interfaces could therefore be seen as very relevant to the management of project contexts, which is the subject of the third and final article of this series.

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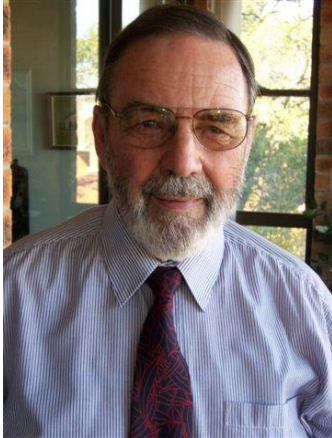
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Alan Stretton is one of the pioneers of modern project management. He is currently a member of the Faculty Corps for the University of Management & Technology (UMT), USA. In 2006 he retired from a position as Adjunct Professor of Project Management in the Faculty of Design, Architecture and Building at the University of Technology, Sydney (UTS), Australia, which he joined in 1988 to develop and deliver a Master of Project Management program. Prior to joining UTS, Mr. Stretton worked in the building and construction industries in Australia, New Zealand and the USA for some 38 years, which included the project management of construction, R&D, introduction of information and control systems, internal management education programs and organizational change projects. He has degrees in Civil Engineering (BE, Tasmania) and Mathematics (MA, Oxford), and an honorary PhD in strategy, programme and project management (ESC, Lille, France). Alan was Chairman of the Standards (PMBOK) Committee of the Project Management Institute (PMI®) from late 1989 to early 1992. He held a similar position with the Australian Institute of Project Management (AIPM), and was elected a Life Fellow of AIPM in 1996. He was a member of the Core Working Group in the development of the Australian National Competency Standards for Project Management. He has published over 160 professional articles and papers. Alan can be contacted at alanailene@bigpond.com.au.

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