

## **Completing the SIP activity framework – what through placement activities should they, and do they, do?**

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### **INTRODUCTION**

This research sets out to complete an activity framework related to Short Industrial Placements (SIPs) undertaken by Masters students on the Industrial Systems, Manufacturing and Management (ISMM) MPhil programme, run by the Engineering Department at the University of Cambridge. During this programme each student undertakes four different SIPs in pairs, working on a real and significant issue for the placement host company. Students are typically engineering graduates, with limited vocational work experience, seeking a practically focused course to prepare them for accelerated careers in industry. The purpose of the activity framework is to describe the activities that may need to be undertaken during a SIP and as a result, be able to support both teaching and learning.

In previous work [1], reported at SEFI 2013, an SIP activity framework was presented at two levels; a top level comprising seventeen different activity groups, see Figure 1 overleaf, and at a more detailed level where the activity groups were broken down into four to eight different key activities. Whilst this research was successful in identifying the key activities related to twelve 'process' activity groups (groups 1 to 12) and, to some extent those related to 'Managing the relationship with the client' (group 13) and 'Project and task management' (group 14), it was not successful in capturing the key activities related to the through placement activity groups of 'Working with others', 'Managing self' and 'Working with and managing information' (groups 15, 16 & 17).

The through placement activity groups were initially determined by combining key elements of consulting practice [2] with a framework of generic skills [3] designed to bridge the worlds of Higher Education (HE) and the workplace. The categories were then shaped to reflect the context of the SIP.

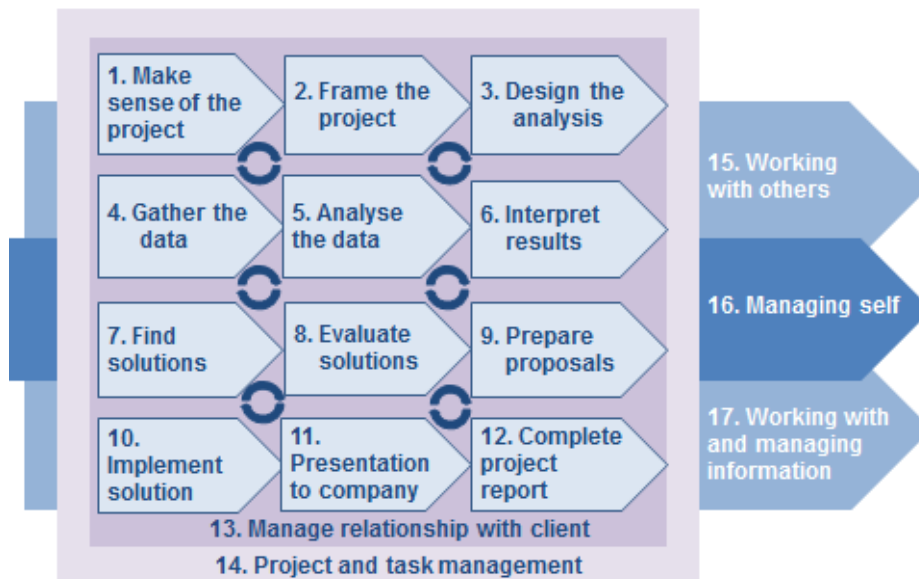
The purpose of this study is to determine the key through placement activities for students whilst undertaking SIP's. Firstly the previous unsuccessful work is reviewed, prior to setting out the approach to be taken this time.

### **1 LEARNING FROM INITIAL RESEARCH**

During the 2012-13 academic year, using an action research approach, data was collected on through placement activities in three of the four student placements. During the second placement a daily activity recording tool was piloted containing some important through placement activities from the authors perspective. All activities were found to be done, often on a daily basis. Student feedback suggested there were too many obvious activities e.g. 'listen'. So during the third placement a revised set of activities was included focussing on those that support successful projects considered by the authors to be less obvious to a novice student. Again, all these activities were reported as done.

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*Figure 1. Top Level SIP Activity Framework*

Reflecting on these results, a number of concerns were identified; students could be interpreting our activity descriptions in different ways, it was not possible to determine the range of activities from a student perspective and the data did not really tell us or students anything particularly helpful e.g. it did not differentiate between activities that were more important or more difficult than others.

With limited time before the final project, some specific through placement activities associated with managing the relationship with the client (group 13) and project and task management (group 14) that could be linked with a particular process activity group (groups 1 to 12) were incorporated into the detailed framework. For the remaining through placement activities, typically relevant on a daily basis and across all stages of the project, it was concluded that a different approach was required.

Following their final SIP, the students were asked to describe three challenging though placement activities for the groups of 'managing self', 'working with others' and 'working with and managing information'. An analysis of this data led to the following conclusions;

- there was an extensive range of activities that varied significantly between individuals
- students describe activities using different language and at different levels of detail
- these though placement activity groups are very different in nature and so should be considered on an individual basis.

## 2 RESEARCH APPROACH

The above findings, coupled with the programme aim of preparing students to work in industry and the authors' observation that in each cohort there is a wide range of abilities to perform through placement activities, suggested that these activity groups should be described to students in terms of context relevant frameworks. This would enable students to consider the range of activities they 'should do', position their activities and, provide them with some of the recognised terms used in industry.

So the approach adopted during the 2013-14 academic year, was to develop a relevant framework for each activity group from literature and, in parallel collect data at the end of each of the four SIPs on the activities the students considered most important. The responses would then be analysed in relation to the derived frameworks to check for relevance and, determine those activities that were the most important from the students perspective. This approach was considered more reliable than if individual students had done the interpretation as the researcher was both experienced in the world of work and in undertaking SIPs during previous studies. A second researcher, with many years of

experience in running SIPs would review these interpretations. Any differences of judgment would be discussed and an outcome agreed. Once satisfied that the relevant frameworks have been identified then appropriate ways of combining these with the existing framework would be reviewed.

### 3 LITERATURE REVIEW AND FRAMEWORK DEVELOPMENT

The objective was to identify relevant practice literature for each of the five through placement activity groups and then develop frameworks relevant for the SIP context. The literature search sought to find evidence based 'best practice', recommended practice amongst professional bodies, and terms that are commonly used both in the UK and internationally. As much practice literature is aimed at practitioners in the workplace, rather than students undertaking a SIP, it is important to extract relevant aspects. Each through placement activity group will be considered in turn starting with 'Project and task management' as 'Manage the relationship with the client' is a subset of this.

#### 3.1 Project and task management

Project Management is a recognised profession and has a defined body of knowledge which is captured in the PMBOK guide [4]. This global standard presents the knowledge that is recognised by the Project Management Institute (PMI) as good practice and includes a set of standard terms. This recent and regularly updated guide provides a practice framework adaptable for a SIP. The guide recognises 47 processes (groups of activities) that fall into ten knowledge areas that are typical of almost all projects. Each knowledge area captures a complete set of concepts, terms and activities.

The PMBOK guide is designed for project managers in the workplace. To adapt this for a SIP, each knowledge area and process was reviewed independently by both authors to agree its relevance. As a result three of the ten knowledge areas were removed i.e. cost, quality and procurement management as well as three processes from other areas. This left 33 processes which are shown in Table 1 below.

*Table 1. Project Management knowledge areas and processes*

Knowledge Areas	Processes
Integration Management	Develop Project Charter, Develop Project Management Plan, Direct and Manage Project Work, Monitor and Control Project Work, Perform Integrated Change Control, Close Project
Scope Management	Plan Scope Management, Collect Requirements, Define Scope. Create Work Breakdown Structure (WBS), Validate Scope, Control Scope
Time Management	Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Resources, Estimate Activity Durations, Develop Schedule, Control Schedule
Team Management	Assess Project Team Capability, Develop Project Team, Manage Project Team
Communications Management	Plan Communications Management, Manage Communications
Risk Management	Plan Risk Management, Identify Risks, Perform Qualitative Risk Analysis, Plan Risk Responses, Control Risks
Stakeholder Management	Identify Stakeholders, Plan Stakeholder Management, Manage Stakeholder Engagement, Control Stakeholder Engagement

#### 3.2 Managing the relationship with the client

The rationale for including this as a distinct sub group within Project and Task Management, see Figure 1, was to emphasise to students that this is critical to completing a SIP within the two week time frame, in particular in terms of accessing the relevant resources and data at the company.

The significant aspects of 'Managing the relationship with the client' have been identified and agreed by both authors from Table 1 and are shown in Table 2. These relate to stakeholder, integration, scope and communications management. The consultancy practice literature [2, 5] was also reviewed to identify any further activities relevant to the SIP context. Whilst this did not uncover any new activities there were many insights on how to do these activities in practice which would be of value to

students. These include showing consideration to the client [2] which contains advice such as; work around their schedule, send agenda's ahead of time, and appreciate what they have done. This demonstrates overlap with the 'working with others' activity group.

*Table 2. Managing Relationship with Client*

Knowledge Areas	Processes
Integration Management	Develop Project Charter, Develop Project Management Plan, Perform Integrated Change Control, Close Project
Scope Management	Define Scope, Validate Scope
Communications Management	Manage Communications
Stakeholder Management	Identify Stakeholders, Manage Stakeholder Engagement

### 3.3 Working with others

In the PMBOK Guide [4] 'working with others' is most closely related to the 'Interpersonal skills' they set out in Appendix 3 which enable project managers to accomplish work through the project team and other stakeholders. These are presented as a list, independent of the PMBOK framework so are different in format to the frameworks in 3.1 and 3.2 above. The focus on 'softer' interpersonal skills in this activity group is thought to be helpful as it provides a clear differentiation between 'harder' project management skills.

Whilst recognised [4] that project managers use additional interpersonal skills, the ones seen to be effective in managing a project are: leadership, team building, motivation, communication, influencing, decision making, political and cultural awareness, negotiation, trust building, conflict management and coaching. This list was compared with activities set out in the National Occupational Standards for Management and Leadership [6] to check for completeness.

Although the two sources describe categories in different ways and at different levels of detail they were broadly consistent. However, neither was found to contain consistently clear and distinct descriptions. In the case of the PMBOK guide there was a problem with the level of definition. For example Leadership and Trust Building are listed as separate skill areas but on reading the detailed descriptions trust building is positioned as part of leadership. A framework that combines the appropriate activities from both sources is presented below in Table 3.

*Table 3. Working with others*

Categories	Activities
Leadership – getting things done through others	Provide leadership for your team and in your areas of responsibility, Develop & communicate vision, Motivate and inspire others, Build trust and respect
Team working – working together to deliver a project	Define and negotiate roles, responsibilities and procedures Develop and maintain team relationships
Communication	Identify communication channels and information needs, Maintain communications, Clarify understanding, Listen to others
Negotiation	Negotiate agreements
Decision making	Define and manage process
Political and cultural awareness	Finding out and understanding how things are done in the company, Manage cultural diversity in the team
Conflict management	Identify and manage conflicts
Coaching	Help team members to develop existing or build new skills

### 3.4 Managing self

The data collected during 2012–13 illustrated not only how important [1] and challenging the students found this area but also the huge diversity of activities involved from time management to managing physical and mental well-being. The practice literature in this area is extensive and is largely targeted

at the self-development market. Prominent management academics have conducted research or applied business management theories to this area [7] and whilst some of these ideas are relevant to students and SIPs the majority relate to people later in life in managerial posts. Much of the Time Management literature covers aspects of managing self with some being more evidence based than others. Although these general guides contain some relevant practice, few take a holistic approach and even fewer were found to focus on the transition from education to work.

A framework developed by Pedler and Boydell [8] combines classic perspectives of self processes that require management of thinking (head), feeling (heart) and doing (behaviour) with four aspects of a person that need managing being; health – a sound mind in a sound body, skills – mental, technical, social, action – getting things done in the world and, identity – knowing who you are, accepting yourself while having an idea of who you want to become. This framework shown in Table 4 enables the scope of this activity group to be explained to the students and the positioning of specific aspects related to SIPs. The framework includes some examples of aspects suggested by Pedler and Boydell and others from the National Occupational Standards for Management and Leadership [6]. However, the aspects stated are not all activities and include attitudes, values and behaviours.

*Table 4. Aspects of self that require managing – adapted from Pedler and Boydell*

	Processes that require managing		
	Thinking	Feeling	Doing
Health	Managing stress	Awareness, acknowledgement, balance	Exercise, diet, lifestyle
Skills	Memory, logic, creativity	Interpersonal, social	Physical, technical
Action	Planning, making decisions, being open to suggestions and feedback, self-assessment, professional development	Concern for you and others, making moral decisions	Time management, taking initiative, dealing with setbacks and frustrations, building professional networks
Identity	Values, ethical and moral standards, knowing yourself	Recognising and accepting your strengths and weaknesses	Self-motivation, being yourself

### 3.5 Working with and managing information

This set of activities has grown significantly over the last two decades due to changes in the availability and access to information brought about by the digital age and the internet. This has not gone unnoticed and there is a growing academic field called Personal Knowledge Management (PMK). Cheong and Tsui [9] track the development of thirteen different PMK models from 1999 and acknowledge that some concepts and ideas go back much further such as Drucker's concept of the 'knowledge worker' and Polanyi coining the term 'personal knowledge management' in the late 1950's.

Of the seven skill/activity centric models identified [9], the one judged most appropriate for a SIP [10], deals not only with the individual but also the collaborative aspects of working with and managing information. This model, also noted for its problem solving perspective on PKM, describes seven skills of: retrieving, evaluating, organising, collaborating around, analysing, presenting and securing information. The authors [10] also note the need for the adaption of their generic framework to the particular situation and discipline. Adapting this to the SIP context, and presenting this in terms of activities, results in the development of the framework shown in Table 5 overleaf. There is some overlap with the process activity groups of the existing SIP Activity Framework most markedly related to gather the data, analyse the data, interpret results and presentation to the company.

*Table 5. Working with and managing information – adapted from Avery et al*

Activity groups	Activities
Retrieve information	Search for information Gather information from different sources e.g. print, electronic, people

Evaluate information	Evaluate relevance Determine quality and status of information Deal with incomplete or inconsistent data
Organise information	Determine an appropriate way to organise information given the context, Undertake regular and systematic organisation of information
Collaborate around information	Determine appropriate information/communications systems Determine procedures for information exchange, retrieval and cataloguing
Analyse information	Determine an appropriate method and tool for data analysis e.g. excel Process the data Analyse results to extract insights
Present information	Determine an appropriate format to communicate to the audience
Secure information	Protect information Keep all sensitive data information confidential

#### 4 DATA COLLECTION AND ANALYSIS

Students were asked to describe in their own words up to five activities they considered the most important for each through placement activity group. Following the first two SIPs students captured their activity descriptions on post it notes and stuck them on the relevant chart. The limited writing space and anonymous process caused a few responses to be too high level to be interpreted meaningfully or silly. So post SIPs 3 and 4 students were given a form to complete which gave a better quality of response. New data on 'Project and task management' and 'Managing the relationship with the client' was just collected following SIPs 3 and 4.

The data was compared against each of the frameworks proposed in the previous section to determine if they were appropriate and how they may need to be developed further. Data was analysed at the higher level of each framework as responses varied at the level they described an activity. Each description was analysed and a summary of the results is presented in Table 6.

*Table 6. Summary of Results*

	Through Placement Activity Groups				
	Project and task management	Managing the relationship with the client	Working with others	Managing Self	Working with and managing information
No. of descriptions	181	202	344	311	304
No. of relevant descriptions	161	156	290	289	276
% could not place	0%	0%	2.0%	0%	0.7%

Although students were asked to describe activities a number of responses related to behaviours, some were just comments and some described activities in other activity groups. The 'number of relevant descriptions' strips out these other responses. Results from each activity group are discussed in turn.

##### 4.1 Project and task management

All of the relevant descriptions could be mapped onto this framework at a high level. In some cases it was not possible to determine a single placement for a described activity – a frequent example related to planning where it was unclear if students were talking at a high level related to Integration Management or at the more detailed level of 'develop schedule' in the Time Management category.

Time, Integration and Team Management were the categories most often described followed by Scope, Stakeholder and Communications Management. The least mentioned category was Risk

Management. As all descriptions could be mapped and were distributed appropriately across the categories it was concluded that the adapted framework in Table 1 was appropriate for a SIP.

#### **4.2 Managing the relationship with the client**

None of the relevant descriptions fell outside of the activity groups described in Table 2. It was again difficult to map descriptions onto single activities as many referred to two aspects of the framework in their description. Aspects of 'Manage communications' were most often described accounting for 47% of responses. 'Integration management' accounted for 25% and 'Stakeholder management' 22%. 'Scope management' was least described but often mentioned in conjunction with Integration Management activities. Again, as all descriptions could be mapped and were distributed appropriately across the categories it was concluded that the adapted framework in Table 2 was appropriate.

#### **4.3 Working with others**

The analysis of this data found that the categories of team working and communication were significantly larger than the others. With teams of two and communication between team members being essential, this is not unexpected. However, the purpose of the communication, or team working was often missing e.g. to make a decision, which could have caused bias. In addition 2% of the descriptions could not be placed. Different categories emerged from the data such as understanding other people (particularly project partner), making joint sense of the situation and working together creatively. So it was concluded that the framework for this activity group requires further development.

#### **4.4 Managing self**

Whilst aspects related to 'action' and 'doing' were most common, all dimensions were populated and all student descriptions were able to be placed. Whilst further work is required to differentiate activities from other aspects mentioned this appears to be an appropriate framework.

#### **4.5 Working with and managing information**

There was an overlap with 'Design the analysis' (group 3) in the top level framework which was not anticipated. Once these activities had been removed the remaining activities were a good fit for the proposed framework. The two (0.7%) items that could not be placed were too abstract to be placed in any category but were still relevant to the overall group. Activities in the 'Evaluate information' category were the most frequently stated followed those in 'retrieve' and 'organise' information. 'Secure' data in contrast was only mentioned once across all four projects – and that was from the student perspective having a backup i.e. protect information against loss. Another aspect, keeping client information confidential was not mentioned and is a definite 'should do' activity for SIPs.

### **5 DISCUSSION & CONCLUSIONS**

Four of the five frameworks evaluated would appear to be appropriate for a SIP. These need further adaptation to be able to present them in a consistent way to the students and to enable integration with the existing framework. Once complete, these should be reviewed by students from the 2013–14 cohort to test that they make sense before using them in practice. The remaining framework related to 'Working with others' requires more work to make sure it reflects all the activities undertaken. Other literature to be explored includes team working and those fields related to social interaction. A new framework can be tested using the same data which will enable a direct comparison with the results reported in this paper.

Overlapping activities and activity groups still present a challenge. A framework that uses two dimensions, as in the case for 'Managing Self,' would appear to enable a greater degree of complexity to be integrated in a way that is both simple to understand and copes effectively with overlaps. This aligns with Dowling and Hadgrafts' three dimensional discipline model [11] which enables activities to be described in terms of their technical, process and generic capabilities and suggests that such an approach may help with the 'working with others' activity group and potentially for the framework as whole.

There were a number of student activity descriptions that were not relevant to the activity group on which data was being collected. This may be because the students did not have a copy of the top level SIP Activity Framework to refer to whilst recording the data or, they did not think in depth about their answers, as well as a lack of clarity between activity group boundaries. Further work needs to identify

ways of improving the differentiation between activity groups and aligning some groups with 'harder' and other groups with 'softer' activities may be helpful.

An analysis of the distribution of student descriptions across the frameworks has enabled those activities considered most important to be identified. It has also highlighted some activities that are hardly mentioned and really are important 'should do' activities during SIPs including keeping client data confidential and project risk management. It may be that these just do not feature in what students consider to be their top five most important activities. However it will be worth ensuring that such activities and the reasons for doing them are clearly articulated to future student cohorts.

For each of the 12 process activity groups in Figure 1 there is a detailed description and a set of more detailed activities. If a comparison is made between these detailed activities and those appearing in the through placement activity frameworks it can be seen that they are on a similar level. This would imply that the overall framework needs to operate on three levels and that the existing top level framework in Figure 1 contains a mix of levels. It is suggested that there are in effect 5 top level activity groups being 'Do the project' which comprises activity groups 1 to 12, 'Manage the Project' which comprises activity groups 13 and 14 and then the other through placement groups of 'Working with others', 'Manage self' and 'Working with and managing information'. So a new representation of the framework requires developing. So, whilst not yet there yet, the objective of completing the SIP framework is closer to being realised.

## 6 ACKNOWLEDGMENTS

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