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Mapping a portfolio to SFIA – worked example

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Introduction

This paper presents a worked example of the portfolio mapping process approved by the Institute of Coding (IoC) Accreditation Panel.

Only the technical activities and reflection contained in the fictional portfolio, as the IoC Accreditation Panel agreed that the generic responsibility requirements should be scored using the BCS RITTech assessment matrix, which is not in the public domain; however, the RITTech algorithm shares several principles with the IoC process.

Scoring Approach

The IoC mapping process is criterion based, and is designed to be straightforward for academic staff assessing student-generated portfolios from, for example, work placements.

To meet the definition of competency, the portfolio must include multiple entries describing successful completion of each of the activities specified for a selected SFIA skill. The second key aspect is that these entries should be verified by the students' workplace supervisor.

The items of evidence required, and a set of quality criteria for those portfolio entries, are set out in Table 1(a). A similar set of items of evidence and quality criteria is defined for the student's *reflection* on their technical achievements, in Table 1(b).

Table 1: Assessment Criteria for Portfolio Entries (From Institute of Coding Mapping Scheme [1])

(a) Technical Achievement (Weight: 16)

Item of evidence	Quality criteria
Portfolio entries showing completion of components from a SFIA skill in a real-world environment	There is more than one portfolio entry for at least 85% of the components
Supervisor comments confirming the accuracy of the portfolio entries	There is more than one portfolio entry for at least 50% of the components Supervisor comments evaluate achievements against their context Portfolio entries are based on evidence rather than assertion

(b) Reflection - (Weight: 9)

Item of evidence	Quality criteria
Reflective ad-hoc portfolio entries for achievements across skill	The style of portfolio entries is appropriately professional
Portfolio identifies area(s) of personal development	Reflection is based on evidence rather than assertion
Portfolio identifies instances of personal/professional accountability for achievements	Personal development claims supported by comparison of achievements across period of experience Recognition of accountability related to (potentially) customer-facing achievements

(c) Marking Scheme

Evidence present	Criteria Satisfied	Score
All items	100%	4
	75%	3
	50%	2
	< 50%	1
1 item missing	100%	2
	> 50%	1
2+ missing/None	-	0

The portfolio is first reviewed to characterise the activities recorded, and from that to select the most appropriate SFIA skill and level. This requires some knowledge of SFIA on the part of the assessor. If the assessor has an early opportunity to discuss with the student the work activities they are likely to be completing, it may be appropriate to suggest to the student against which skill(s) their achievement might be mapped, which may help the student to ensure that they do, indeed, tackle at least 85% of the activities in at least one skill.

For the mapping, portfolio entries are identified which correspond either to activities defined for the selected SFIA task, or to the other items of evidence required. Some evidence, such as reflection, or supervisor commentary, may be in separate documents submitted alongside the portfolio. Reading the portfolio and supporting documents should result in a map showing which criteria (items or evidence, quality criteria) are satisfied by the portfolio.

The maps for the two aspects of technical achievement and reflection are scored using the marking scheme in Table 1 (c). Using the weightings shown in Table 1, of 16 and 9 for technical achievement and reflection, respectively, gives an overall score between 0 and 100.

Review the portfolio

Since multiple portfolio entries are required for each activity in the selected SFIA skill, it may help with recording identified entries to construct a table of the form of Table 2, containing the activities described for the selected SFIA skill at the appropriate level.

Table 2: Recording table

Component	Entry 1	Entry 2	Entry 3
Activity 1			
Activity 2			
Activity 3			
Activity 4			

Reviewing the fictional portfolio in Appendix A, there is a high proportion of data modelling and design activities, for which one appropriate SFIA skill would be DTAN. Thus, Table 2 is instantiated as Table 3. In this particular case, in SFIA version 7, there are only two separate sentences in the skill description, which makes the number of components of the skill two – albeit that the first is rather long; this renders the quality criteria, “more than 50%” and “more than 85%” essentially identical.

Table 3: Recording table for Data modelling and design (DTAN) Level 3

Component	Entry 1	Entry 2	Entry 3
Applies data analysis, design, modelling, and quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).			
Advises database designers and other application development team members on the details of data structures and associated components.			

Mapping portfolio entries against the skill components

In the next stage, entries from the portfolio are considered in turn to determine whether they provide evidence of the **successful completion** of one or more of the skill components in the instantiated recording table (table 3). For example, the entry for 30th September:

I've reverse engineered a model for one Small Fry database – customers – but it leaves several questions. For example, Whale Sports allows people to be members of more than one gym; but, in Small Fry, if one person is a member of two branches, they are treated as two completely different people. This became clear when I tried comparing the two data models – and some of the data – and found that “customer_id” in Whale Sports’s database seemed to correspond to the compound value (pn, bc) in Small Fry’s database. After talking to some of the IT guys from Small Fry – those who had stayed after the merger – I discovered that “pn” stood for “person number” and “bc” was “branch code”...

describes quite clearly the completion of activities in the first component. Recording the date of this entry against the component in table 3 gives table 4:

Table 4: Partially completed map for Data modelling and design Level 3

Component	Entry 1	Entry 2	Entry 3
Applies data analysis, design, modelling, and quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).	30 Sep		
Advises database designers and other application development team members on the details of data structures and associated components.			

Further examination of the portfolio locates entries on 18th Nov and 2nd Dec for the first component, and on 14th Oct and 2nd Dec for the second. The entry on 2nd Dec shows successful engagement across the skill description, so it can map against both components.

The resulting map for this short extract from a fictional portfolio is shown in Table 5

Table 5: Completed map for Data modelling and design Level 3

Component	Entry 1	Entry 2	Entry 3
Applies data analysis, design, modelling, and quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).	30 Sep	18 Nov	2 Dec
Advises database designers and other application development team members on the details of data structures and associated components.	14 Oct	2 Dec	

It is important that the entries used describe separate achievements, rather than small increments on achievements, already counted, that demonstrate completion of the bulk of at least one component of the skill description.

Scoring for technical achievement

There are brief, but comprehensive, supervisor's comments accompanying the portfolio in Appendix A. These are needed alongside the completed map of achievements to generate a score for technical achievement.

For the items of evidence, the completed map (table 5) shows that there are multiple entries for each component of the selected skill. The supervisor comments confirm the accuracy of these entries. Therefore, all (both) items of evidence are present.

From the map, since there are multiple items of evidence for both components, it follows that the first two quality criteria are satisfied – more than 85% of the components, and also more than 50%. Furthermore, the portfolio entries provide the kind of evidence that is possible in a portfolio – such as the discussion of the ambiguities between the two databases (30th Sep), and the loyalty scheme (11th Nov). This is “evidence”, in the sense that it provides some detail of the challenges encountered. Other examples might be the number of classes or entity types designed, or the cardinality of the tables imported: anything, in fact, that shows that the achievements are real. It is unrealistic, in a portfolio, to expect “real” evidence, such as entity models, or data dumps – after all, such things may be both large and confidential!

Finally, the supervisor comment emphasises that the achievements were particularly challenging, and that the company is very happy with the students' contribution – to the extent that they have offered him a job.

Summarising this in table 6,

- There are portfolio entries describing successful completion of components of the skill;
- These entries are confirmed by the supervisor
- The entries cover more than 85% (and therefore more than 50%) of the components;
- The entries are based on evidence rather than assertion (they feel “real”)
- And the supervisor has contextualised the achievements and their challenges.

Thus, both items of evidence are present, and all four quality criteria satisfied.

From the scoring scheme (Table 1(c)), this gives an unweighted score for technical achievement of 4.

Table 6: Completed score table for technical achievement.

Item of evidence	Quality criteria		
Portfolio entries showing completion of components from a SFIA skill in a real-world environment	√	There is more than one portfolio entry for at least 85% of the components	√
Supervisor comments confirming the accuracy of the portfolio entries	√	There is more than one portfolio entry for at least 50% of the components	√
		Supervisor comments evaluate achievements against their context	√
		Portfolio entries are based on evidence rather than assertion	√

Score for reflection

Quite often, depending on local arrangements, the reflection may be produced as a document separate from the portfolio itself, perhaps because a “reflective report” is a requirement for all placement students at a university, whether or not they are building a portfolio.

The sample portfolio contains some reflective entries (e.g., 13th Sep, 11th Nov), in addition to the overall comments at the end. Hence, using the reflection scoring table (Table 1(b)), it is clear that the first item of evidence is present.

There are entries (e.g. 23rd Sep) that identify personal development opportunities, although there is no confirmation that they were followed up.

There is also some evidence (in the reflection) that the student was aware how important the database merger project was to the company; this seems to be as close as he gets to an appreciation of his personal and professional accountability! So, that item of evidence is also present.

Table 7: Reflection scoring table

Item of evidence	Quality criteria		
Reflective ad-hoc portfolio entries for achievements across skill	√	The style of portfolio entries is appropriately professional	√
Portfolio identifies area(s) of personal development	√	Reflection is based on evidence rather than assertion	√
Portfolio identifies instances of personal/professional accountability for achievements	√	Personal development claims supported by comparison of achievements across period of experience	×
		Recognition of accountability related to (potentially) customer-facing achievements	×

As for the quality criteria, it would be reasonable to deem the first two to be satisfied. However, although some personal development opportunities were identified, there is no real discussion of their impact; and even the overall reflection is focussed on the internal company requirements, rather than on the potential impact on customers. Thus, the second and third quality criteria are not satisfied for this portfolio.

Using the scoring scheme again, this gives an unweighted score for “reflection” of 2.

Total weighted score

Given the weights in table one, the total score is:

$$\begin{aligned} & \text{Tech. achievement score} * 16 + \text{reflection score} * 9 \\ &= 4 * 16 + 2 * 9 \\ &= 82 \end{aligned}$$

The mapping scheme approved by the IoC accreditation panel has two thresholds: 65 for “proficiency”, and 85 for “competency”. Thus, the portfolio in Appendix A provides evidence of **proficiency** in DTAN3.

However, it is also necessary for the student to have demonstrated the generic responsibility characteristics for SFIA Level 3 (Appendix B). Under the IoC approach, these are assessed using the BCS scoring approach for RITTech, which is not, unfortunately, in the public domain.

Appendix A: selected extracts from fictional student portfolio

Joe Smith - Portfolio (extracts)

6th September

My placement employer, Whale Sports, operates a large national chain of gyms and fitness centres. In the weeks before my placement started, they had completed the purchase of a much smaller local chain, Small Fry Fitness. My main role within the IT department will be to arrange for the merging of Small Fry's records into Whale Sport's main customer, financial and operations databases.

I'm expecting to draw on my second year data management module – although it should really be quite straightforward, as both companies use standard relational database software. So, it should just be a question of writing a few scripts to transfer the data.

My initial estimate is that this should take no more than a week or two.

9th September

Attended a company induction today for all the placement students and interns. Whale Sports really is a bit larger and more complex than I expected – and the takeover of Small Fry makes it even more so!

One of the things that came out of the induction is that there are online learning resources that cover particular areas of the company's operations – such as customer registration and session bookings. I'm not sure how many of them will be useful – after all, I'm only looking at the data! – but I shall bear them in mind if I have time.

13th September

This is not going to be quite as straightforward as I expected. The database structures for Small Fry are completely different from those of Whale Sports. They claim to serve similar purposes, with the same sort of scope and a similar set of operations. There are just so many differences – ranging from different field names for apparently the same things to completely different sets of foreign keys.

What's more, the two databases run on different DBMSs which, even though they both use "standard SQL", seem to do quite a lot of things – particularly scripts! - in different ways. This will just make the job even more challenging...!

I'll mention it all to my supervisor next week – and if that doesn't help, I'm expecting my University tutor to visit later in the week.

20th September.

An interesting week.

My supervisor just told me that I was supposed to understand databases, so why couldn't I just get on and sort it out?

Fortunately, when my tutor visited, he reminded me of all the data modelling we did in the data management module. So, I'm going to try comparing the data models for the two sets of data – and match the structures rather than the field names.

23rd September

At least there are full specs – including data models! – for Whale Sports’s database. They’re drawn using a notation that’s a bit unfamiliar, but, as we were taught in the DM module, the basic concepts represented in all of the notations are essentially the same.

Small Fry, however, is a bit more of a problem. There’s not even a data dictionary. I’m going to need to reverse-engineer the data structured from Small Fry’s three separate databases.

I also need to understand better the ... idiosyncrasies of the two DBMS, so I’ve found some online learning material. I’m focussing first on the Small Fry system, as that implementation seems to have come with virtually no documentation – so I need to be able to work out what’s going on from the code!

So much for a simple job of a few SQL scripts....!

30th September

I’ve reverse engineered a model for one Small Fry database – customers – but it leaves several questions. For example, Whale Sports allows people to be members of more than one gym; but, in Small Fry, if one person is a member of two branches, they are treated as two completely different people. This became clear when I tried comparing the two data models – and some of the data – and found that “customer_id” in Whale Sports’s database seemed to correspond to the compound value (pn, bc) in Small Fry’s database. After talking to some of the IT guys from Small Fry – those who had stayed after the merger – I discovered that “pn” stood for “person number” and “bc” was “branch code”...

I need now to list all the ambiguities and oddities in the data model for Small Fry, and spend some time with their former IT guys.

...

14th October

My supervisor is really impressed that I’ve managed to resolve all of the differences between the two customer databases. However, she’s getting a bit worried about how long it is taking, as there is a deadline to have the merged systems running by the start of January next year. And we’ve not even started on the various applications that hang off Small Fry’s customer database. And I’m not going to make any rash estimates this time.

The upshot is that she’s asked me to brief one of the developers – Phil – on the structure of Small Fry’s database, so that he can export, clean and reformat the data to put it into Whale Sport’s main database.

She’s also given me someone to help – another placement student, Andrea. She wants me to brief Andrea on the approach I took for the customer database, so that she can tackle the financial database while I focus on the operations database. Her parting comment was that the operations database was likely to be the trickiest, as it is in the way they run their operations that companies seek to distinguish themselves.

...

11th November

Phil has more or less completed the transfer of the customer data, and has even replicated most of Small Fry’s distinctive customer functionality – such as the loyalty scheme – within Whale Sports’s systems. The loyalty scheme was a bit of a challenge, as Whale Sports had nothing like it previously. So, once Phil and I really understood what it was doing – and had checked our understanding with some of the Small Fry managers that now work for Whale Sports – we presented our findings (supported by my supervisor) to a

meeting of Business Managers; they really liked the idea of the scheme, and are now rolling it out across Whale Sports.

As an aside, I would never have followed the logic of Small Fry's loyalty scheme if I hadn't been able to follow the detail of the code. It really is a good job I spent time learning about their DBMS a couple of months ago!

Andrea has also made good progress. Having two people working on different aspects of the problem has made it much easier to check our understanding, to validate each other's assumptions, and check our respective models. It works better, too, when we are meeting with the ex-Small Fry staff – it seems to run much more positively with two of us talking with three or four guys who – as far as we could tell – would really have much preferred to have been left alone in their tiny company.

18th November

We've completed formal model reviews with my supervisor for the second and third data models, and they have been signed off. Andrea and I are now working with Phil to get all of the data transferred by the end of this month – so that there is plenty of time for testing.

2nd December

The data transfer and merge project has been signed off as complete.

My supervisor seems very happy – so much so that she has asked Andrea and me, as a team, to trawl through the data models and specs for the main Whale Sports database, to discover any anomalies, odd assumptions ... or even errors. She's also asked me to present an internal talk to the development team on how I approached the modelling task, so that there will be other people who can do the job after Andrea and I go back to our respective Universities.

Reflection on placement portfolio

Reading through my portfolio again, I remember that one of the things that kept striking me – hard – was how much of the boring detail in my university modules was actually incredibly useful. I recall that I never paid much attention to all the data modelling we did – after all, it's so easy to prototype a database nowadays, that there doesn't seem to be a lot of point in designing it first.... It's just not "agile" ...!

But then, in my placement, I found time and again that I was using aspects of that modelling to resolve the issues. What's more, it was because I was able to do that they my supervisor was so impressed – particularly when I went on to discover a couple of howlers in Whale Sport's main systems!

It was also an eye-opener working with real colleagues in a team, to achieve something important. I suppose I was the team leader, but it was all very collaborative – and what really seemed to matter was that we recorded and documented our decisions, rather than that any one of us was actually "in charge".

And it was quite scary at times to realise that the work I was leading actually mattered to Whale Sports. If we hadn't got it right, then their investment in Small Fry could just have fallen over...!

Finally, I've just been offered a permanent job at Whale Sports To lead their data migration team!

Supervisor comments

Joe came to us as a fairly “ordinary” placement student, to work in the data migration team. As he mentions in his portfolio, we had just acquired a small company, Small Fry Fitness, and I asked Joe to transfer Small Fry’s data into our corporate database.

His commentary shows that he started fairly optimistic about how simple it would be. I didn’t disabuse him – I knew that there would be a few problems, but, frankly, I had no idea how challenging it would turn out to be. Joe rose to the challenge superbly. He took it upon himself to learn about the systems involved, and seems now to understand more about the Small Fry system than his colleagues who used to run their IT department!

His work was so thorough and so well-documented that it became a benchmark within the team. As he comments, I asked him to give a seminar, with the two other members of his team, so that we would retain at least some of his knowledge after he left.

So, I am very happy to confirm the content and detail of Joe’s portfolio. If anything, he sells himself a little short – this really was a difficult project. Moreover, he hardly mentions how effective he became as a mentor and team leader to his immediate colleagues, Andrea and Phil.

We have this morning offered Joe a position as Data Migration Team Leader when he graduates – I really hope that he will accept it!

Appendix B: SFIA description for Data modelling and design (DTAN) Level 3

Technical activities

- Applies data analysis, design, modelling, and quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).
- Advises database designers and other application development team members on the details of data structures and associated components.

Level 3 Responsibilities

Autonomy

Works under general direction. Uses discretion in identifying and responding to complex issues and assignments. Receives specific direction, accepts guidance and has work reviewed at agreed milestones. Determines when issues should be escalated to a higher level.

Influence

Interacts with and influences colleagues. Has working level contact with customers, suppliers and partners. May supervise others or make decisions which impact the work assigned to individuals or phases of projects. Understands and collaborates on the analysis of user/customer needs and represents this in their work.

Complexity

Performs a range of work, sometimes complex and non-routine, in a variety of environments. Applies methodical approach to issue definition and resolution.

Knowledge

Has a sound generic, domain and specialist knowledge necessary to perform effectively in the organisation typically gained from recognised bodies of knowledge and organisational information. Demonstrates effective application of knowledge. Has an appreciation of the wider business context. Takes action to develop own knowledge.

Business skills

Demonstrates effective communication skills.

Plans, schedules and monitors own work (and that of others where applicable) competently within limited deadlines and according to relevant legislation, standards and procedures.

Contributes fully to the work of teams. Appreciates how own role relates to other roles and to the business of the employer or client.

Demonstrates an analytical and systematic approach to issue resolution.

Takes the initiative in identifying and negotiating appropriate personal development opportunities.

Understands how own role impacts security and demonstrates routine security practice and knowledge required for own work.