AOSIS

The business case thrives on relevant information

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Background: In recent years, much has been written about how to present a compelling business case. But, if just one critical piece of information is overlooked, it can lead to the wrong decision being taken. This article aims to minimise the risk. It stems from research conducted into how the business case can be used more effectively to improve the success rate of information technology (IT) or information technology or business (ITB) projects. The business case, usually a document, indicates whether the investment in money and resources is justified, prior to or at any time during the project. 'Effective use' involves using certain business case processes throughout the ITB project's lifetime. Here, the life cycle refers only to the IT component of the project. The lifetime is longer, extending from initial proposal until all benefits have been realised. However, it is found that the processes are not easy to adhere to, a probable cause being the lack of relevant information.

Objectives: The aim of this study was to determine what information is needed to drive the business case processes before, during and after the IT deliverables are produced.

Method: The information types are derived from a structured review of literature related to the business case.

Results: Details of the information types to create the business case are presented and related back to the business case content elements. Further information types that only arise during planning and subsequent tracking of the business case are also presented.

Conclusion: For sound project governance, underpinned by effective use of the business case, it is essential to know what information needs to be gathered throughout the project's lifetime. While knowing the processes and their relevant information is essential, further research is needed into the organisational factors that either facilitate, or inhibit such information gathering.

Introduction

Information technology or business (ITB) projects are those where business benefits are achieved through the use of IT deliverables. This article investigates how the business case can be used more effectively to underpin project governance, and hence lead to more successful ITB projects. Although there is no agreed definition of governance, it is considered to be the framework of policies and processes in the organisation to implement projects that will achieve objectives in the overall best interests of involved stakeholders (Musawir et al. 2017). Governance can relate to a single project or to multiple projects where selection and prioritisation are important (Müller, Pemsel & Shao 2014). This article then goes on to address a conclusion, drawn from Einhorn and Marnewick (2016), that lack of understanding of the information required is one of the reasons for the business case not being used effectively. Thus, the focus is on the information that is required to supply and interact with the various business case processes throughout the ITB project's lifetime.

The literature review discusses the nature of the business case, and the processes needed to take full advantage of it. However, it concludes that the processes are not easy to follow, partly because of the amount of information required. This leads to the research question as to the information needed for the effective use of the business case.

A conceptual model is then presented showing the linkages between the business case processes and the information required at different stages of the project's lifetime. A summary of the information is provided, showing how pre-project business case information remains relevant, but needs to be supplemented by further information during planning, execution and benefits realisation phases. Detail of the business case information is given in Appendix 1. Conclusions are then drawn as to whether understanding of business case processes and information is sufficient to enable the effective use of the business case.

Research methodology

Content analysis was used to explore the concept of the business case and to summarise the findings of the literature reviewed. The following processes were used:

- Create a list of key search terms. Key terms are derived from the research topic and include synonyms.
- Identify the source for primary searches. The identification of relevant articles was carried out using online databases such as Scopus, IEEE Xplore and Google Scholar.
- Inclusion and exclusion criteria were developed to narrow the number of research articles, that is:
  - Articles that are specific to the business case. Much of the literature reviewed comes from backward reference searches, and scans of recent years of journals like the *Project Management Journal* and the *International Journal of Project Management*.
  - Articles on themes related to the business case like project governance, causes of ITB project failure and knowledge management.
  - Articles that merely use the term 'business case' as a synonym for 'justification', such as 'the business case for nursing training', were not used.

A coding frame was used to categorise and analyse the results of the selected performance criteria adopted in this research, which were later used to conceptualise the various themes related to the business case. Figure 1 illustrates the themes, and shows that 'business case processes' and 'business case information needs' are close to the core.

Each theme is assigned a unique 'theme tag' in the reference manager tool, which is used to search for relevant papers during the writing on a particular topic. The main tags used for this article are 'PROCCT' – processes to create and track the business case – and 'INFOCR, INFOTR' – information to create and track the business case. Each tag may be used multiple times for a particular article. Thus, each selected idea has a tag, and article page number, in the 'Research Notes' section of the reference manager tool. When writing about business case information, it is possible to seek relevant ideas, even where articles cover several themes. Such references contribute to Tables 1–3, which outline business case information, and to corresponding Tables 1-A1–3-A1 in Appendix 1, which also give the source and use of each information type, as well as at least one reference.

Some judgement is used as to the level of detail, for example, 'Enterprise Environmental Factors' is treated as a single information type, even though it could potentially break down into multiple information types, depending on the project (PMI 2017).

Having extracted the information types, they are mapped, in Table 4, against the business case content elements derived from reference texts, to give some assurance that nothing important has been overlooked.

Literature review
Information technology or business projects and the business case

The following background on ITB projects offers a perspective on their unique aspects and success rate. Peppard, Ward and Daniel (2007) find that IT deliverables alone are insufficient, and that business changes are needed to take advantage of them, to produce business benefits. This means that an ITB project has two parts: developing the IT products and using them to create value (Ward, Daniel & Peppard 2008). Moreover, the two parts are carried out by ITB staff, respectively, who often have different backgrounds and use different terminology. Nevertheless, communication between them is essential as neither group knows all aspects of the project (Sauer & Reich 2009; Zwikael & Smyrk 2012). Information technology or business projects that arise in all industry sectors are known to be challenging, and surveys show that up to 20% of ITB projects fail, with a further 40% being challenged, resulting in considerable wasteful expenditure (Joseph, Erasmus & Marnewick 2014; Standish 2014).

An effectively used business case can do much to address such challenges. A business case is a formal document to set out the rationale for a project investment, justify it and hence to get management commitment and authorisation to proceed. As such, it summarises anticipated benefits while considering alternative options and recommending a preferred solution. It provides an overview of the scope of work, the costs, the time frame and the risks. The business case, owned by the project sponsor or business owner, is subject to review and ongoing viability testing throughout the project's lifetime (Cooke-Davies 2005; Franken, Edwards & Lambert 2009; OGC 2009; PMI 2017).

The business case not only supports project governance from inception, through IT delivery and eventually to benefits realisation, but it also supports the governance of a portfolio of projects, where project selection and prioritisation are needed (Müller et al. 2014). Thus, the business case contributes to success and minimises the risk and impact of failure in the following ways (Einhorn & Marnewick 2016):

- The business case contains the justification for the project.
- By creating and tracking it, stakeholders get a better understanding of the benefits, costs and risks of the project, leading to informed decisions.
- It enables the project to be prioritised against other viable projects.
- The business case, when updated at the end of the planning phase, confirms that the project remains justified.
- Business case reviews allow ongoing optimisation of the project in response to business and other changes, inside or outside the organisation.
- Finally, after IT deliverables are live, the business case allows results to be compared with expected benefits, thus ensuring that none are overlooked.
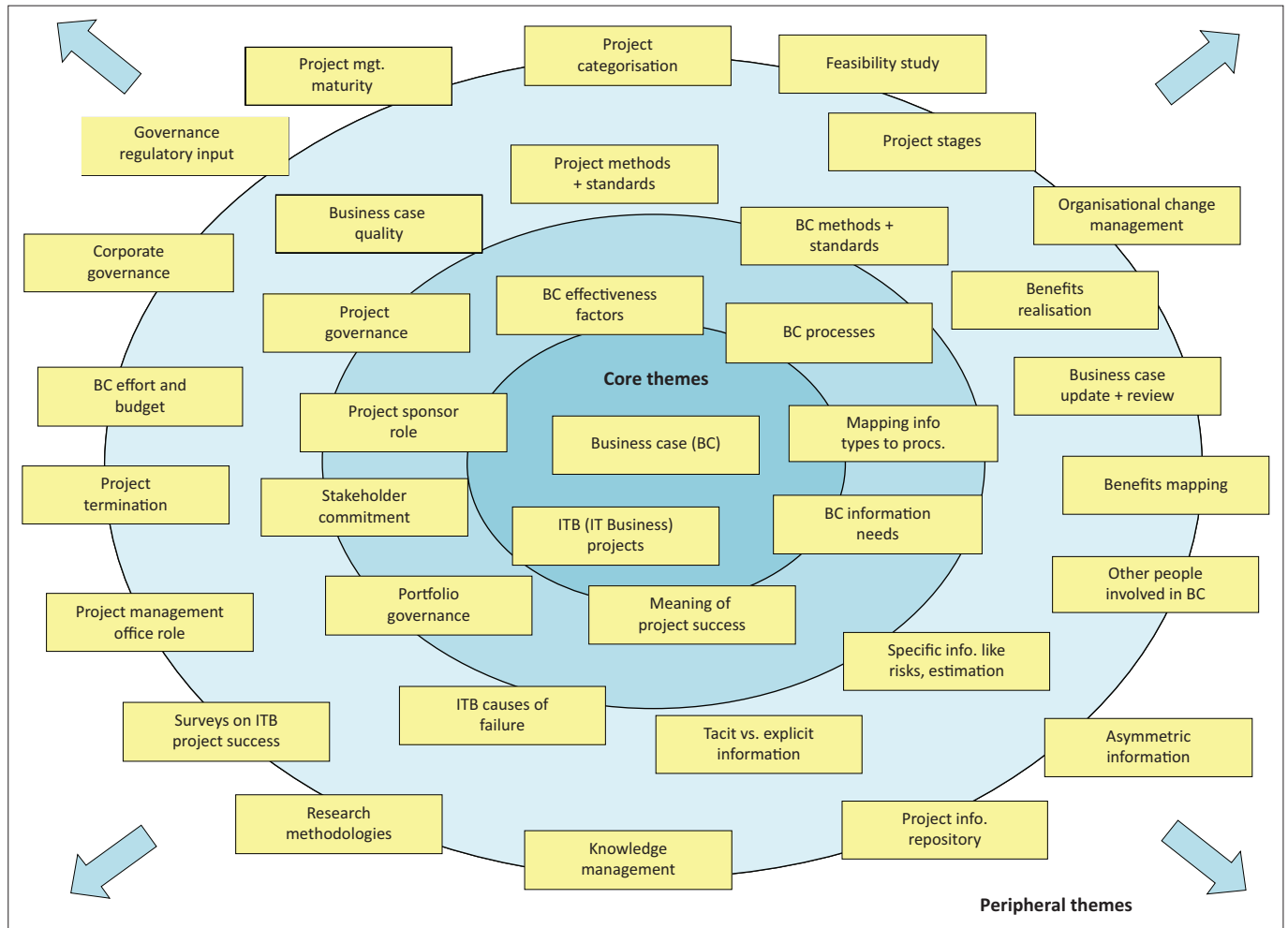
BC, Business case; ITB, Information technology business.

FIGURE 1: Illustration of themes related to the business case.
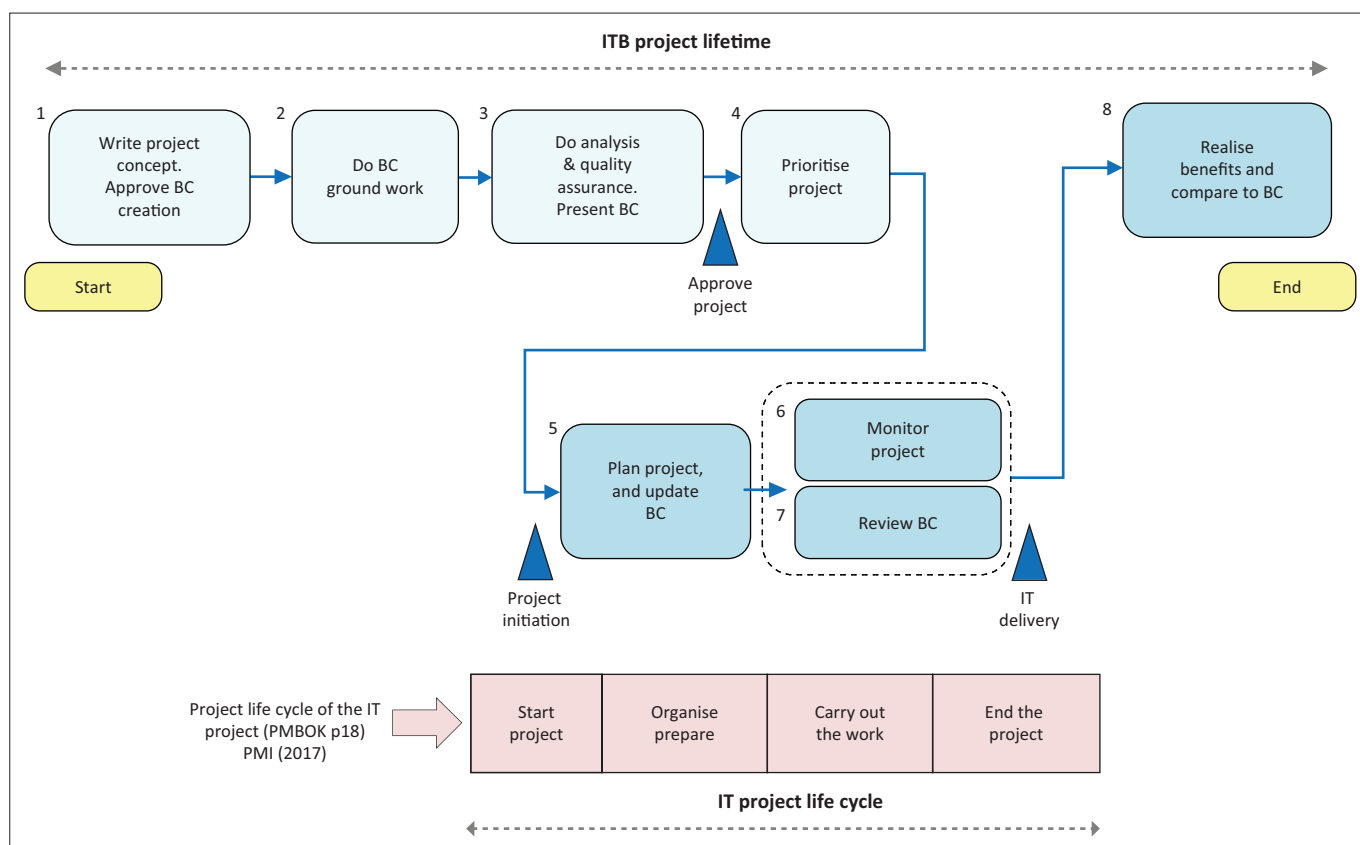
The business case processes

To achieve these benefits, a number of processes need to be followed to create and track the business case. The detail and purpose of each process, and their literature references, may be found in Einhorn and Marnewick (2016). The processes are grouped into 'process groups', illustrated in Figure 2, which are in broad chronological sequence. The process groups are described in the paragraphs that follow. Process groups 1–3, for creation of the business case, are generally done pre-project. In process group 4, approved projects are prioritised and resourced, while process groups 5–8 are done after project initiation. If a project happens to be initiated without a business case, then process groups 2 and 3 should be done early in the immediately following project planning phase.

Process group 1 covers preparation for the business case. A high-level project proposal is submitted to the decision-making authority, which might be responsible for the portfolio of projects in the organisation. It states the business drivers, and sometimes a mapping is done of proposed benefits, to the business processes changes, and IT deliverables, on which they depend. The proposal is evaluated in terms of business priorities. If it is selected, the project sponsor is confirmed and authorisation given to

expand the proposal into a business case; if not, the proposal is rejected and archived.

Process group 2 covers the groundwork for the business case. It might involve considerable investigation, involving the main stakeholders, whose requirements and decision criteria need to be understood. The expected business benefits are detailed with their estimated value over time, and intangible benefits noted. Responsibility for achieving each benefit is assigned to a person, indicating how it will be measured. The main implementation alternatives are considered, and the preferred one stated. The initial scope definition is then done for the preferred alternative, which includes the business process changes, and any organisational changes, required to enable the benefits. An initial risk assessment is conducted, and costs are estimated with a contingency amount to cover risk.

Process group 3 covers assembly, review and presentation of the business case. Based on the groundwork, explanations and estimation methods are documented with necessary evidence, while the underlying assumptions, dependencies and constraints are set out. Where appropriate, the overall financial benefit is calculated, and recommendations are

BC, Business case; ITB, Information technology business.

FIGURE 2: Business case process groups mapped to the IT project life cycle.

stated, emphasising the key themes. Quality assurance is performed to ensure that content is sound, relevant and clear, preferably involving an independent reviewer for major initiatives. Finally, the business case is presented to key stakeholders, leading to a decision or a request for further investigation. Once again, if the business case is rejected, it is archived for future reference.

Process group 4 covers prioritisation of projects that have been approved. It could involve several processes, depending on the governance mechanisms in the organisation. The outcome is a decision whether and when the project will be initiated, based on resource availability.

Process group 5 involves integrating information from the business case into the project plan and benefits realisation plan. At the end of planning it is important to ensure that the business case still aligns to the plan, and remains viable. Future reviews involving the business case should form part of the plan.

Process group 6 covers regular monitoring and reporting of project scope, schedule, costs and risks.

Process group 7 involves *ad hoc* or planned reviews. During the reviews the business case should be updated and checked for ongoing viability.

Process group 8, the last group, involves measurement and assessment of outcomes. Realised benefits are compared with those in the business case and action taken where there is a significant shortfall. After the final assessment, lessons learned are documented to inform future projects.

The eight process groups, which cover the ITB project's lifetime, should ideally be followed in the sequence given, but in practice there is usually iteration. For example, assumptions may be revisited during later project stages, and constant reprioritisation is done during projects that follow an agile methodology. Processes within the groups are often omitted, sometimes justifiably and sometimes to the detriment of the project.

The research problem

It emerges from Maes, De Haes and Van Grembergen (2014) that even where the process groups, and their processes, are well understood, following them is not easy. An inhibitor is the difficulty of gathering relevant information, in sufficient detail, at the appropriate times, throughout the project's lifetime (Einhorn & Marnewick 2016). Therefore, the research problem is: 'There is a lack of understanding of the information required for the business case, resulting in its ineffective use'.

The goal of this article is to understand what information may need to be gathered, depending on the context of the project, and to confirm that it covers the main content elements of the business case.

The relationship between business case processes and information

Figure 3 provides a model that shows the linkages between the business case process groups and the business case information categories. The information types that make up the information categories are described in subsequent sections. The need for the model arose, when it became apparent that much of the information required during tracking, is different from information that is available when the business case is first presented (Brandon 1998; OGC 2009; Samset & Volden 2015). So, additional information is generated during planning, and still more during execution and benefits realisation. The model, constructed from the process groups in Figure 2 and the points at which information becomes available, is referred to when introducing the information categories, setting the stage for detailing the information types within the categories.

One purpose of gathering information is to inform governance decisions. As suggested in the earlier subsection on processes, governance decisions can be taken at any time, but the points, at which they are *typically* needed, are denoted by diamonds marked 'D'. Decisions could be to continue the project, make changes or stop the project (Larson & Gray 2014). The figure illustrates the case where all decisions are to continue the project.

To address the research problem, it is essential to understand what information to seek at different times in the project's lifetime. Such information is categorised into the yellow, green and pink categories in Figure 3, and their interaction with the business case process groups is as follows:

- Information to create the business case (yellow) serves as an input to the first four process groups, as shown by

the arrows 'a, b, c, d'. The information 'a' needed for the first group would be at a high level and might lack detail. Arrow 'c' is double-ended, as the analysis and quality assurance processes, both use information and generate further information. Information 'e', from the approved business case, is a major input to project planning (Cooke-Davies 2005).

- Information from project planning (green) is used in a number of ways. It may update the business case 'f', as more detail emerges. It also creates information 'g', like planned values, that enables the project to be tracked during execution. Here, 'tracking' covers both monitoring of progress and business case review.
- Information for project review (pink) is gathered as the project is executed, like progress and actual costs. Such information is compared to what was planned, and related back to the business case. The comparisons ('h' and 'i') should indicate whether the project, or benefits realisation, is according to plan, or whether an *ad hoc* review is needed. Whether scheduled or *ad hoc*, such a review could lead to governance decisions.

As indicated by the double-ended arrows, all business case process groups, after project start, both use and generate information. Also, because the business case is updated regularly, the 'to create' and 'from-planning' information is effectively used in all subsequent processes (shown by fainter arrows in the figure).

Information required by the business case processes

In this section, the information identified earlier is expanded on using colours corresponding to information categories in
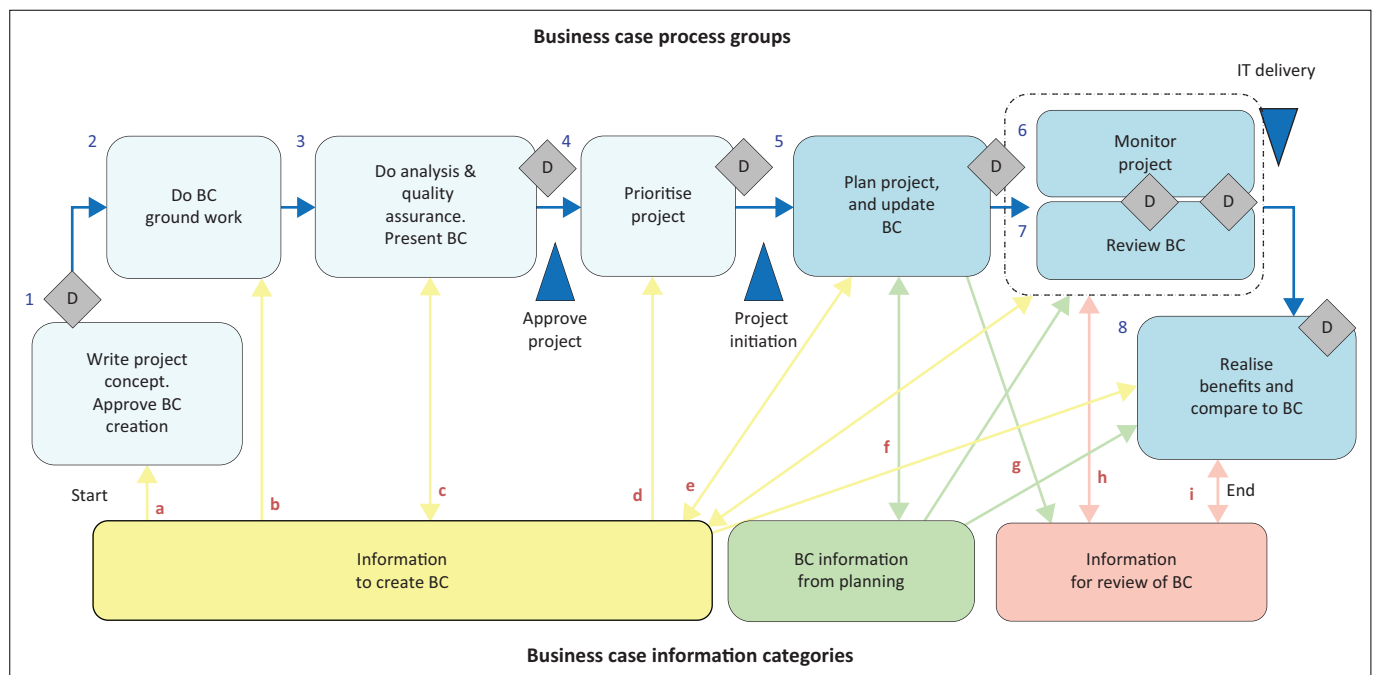
BC, Business case; IT, information technology.

FIGURE 3: The information technology or business case process and information-flow conceptual model.

Figure 3. Further detail of each information category is given in Appendix 1.

Information to create the business case

Information to create the business case is itemised in Table 1.

There is a fine distinction between business case information and domain information, where 'domain' refers to the business, design or technical aspects. Some high-level domain information might be included to ensure effective communication with stakeholders, but detail would be contained in specifications and designs that are usually done after the business case has been created.

Some of the 'to-create' information types may appear in earlier project proposal or concept documents (Larson & Gray 2014). Most of the information would subsequently inform the project plan and benefits realisation plan

(OGC 2009). The information needs to be checked for validity throughout the project's lifetime.

Some metadata could apply to all business case information. For example, the project name may already have been proposed by stakeholders and approved by the sponsor (OGC 2009). Likewise the project number or code may have been assigned by portfolio management. Such metadata, including author and date, would be placed in all documents, often in header or footer text, to give context to the document's contents. Refer to Table 1-A1 for detailed information on the 'to-create' information category.

Information, from project planning, used in business case processes

Information that arises during project planning and is used in business case processes is itemised in Table 2. OGC (2009) recognises that planning gives considerable detail that was not available earlier, and that the business case is likely to change as a result. Therefore, OGC (2009) refers to an 'outline' business case when approval is given to start the project, accepting that information, at this point, is approximate and subject to change.

'From-planning' information also sets up baselines, like planned values, that are used to monitor the project, and review the business case, during and after project execution. Some information types only affect the business case indirectly. For example, schedule risk analysis might show

TABLE 1: Information to create the business case.

Number	Required information to create the business case
1	Project categorisation or type. For example: Mandatory/Operational/Strategic
2	Names of sponsor and key stakeholders (including benefit and change owners)
3	Project description (high level)
4	Business drivers (corporate imperatives supporting the need for the project)
5	Business goals (or investment objectives)
6	Business requirements (high level) or stakeholder expectations
7	Project objectives (high level)
8	Corporate strategy alignment
9	Alternative options to meet business goals (high level)
10	Results of a feasibility study, pilot study or proof of concept (PoC)
11	Results of analysis using financial techniques (like NPV) and non-financial techniques
12	Complexity factors and assessment
13	Critical success factors (CSFs): Inputs that must be in place to achieve success
14	Assumptions relating to any other information or aspect of the project
15	Constraints/dependencies (stated and handled similarly to assumptions)
16	Benefits expected (currently or at the time of project approval)
17	Benefits: estimated monetary value (where agreed), indicating sensitivity to assumptions
18	Benefits: how they will be measured and owned
19	Impact on existing operations (also known as 'dis-benefits')
20	Project scope with deliverables (high level), including benefits realisation activities by business
21	Project scope exclusions (what will not be done in the project)
22	Diagrams (to clarify any aspect of the project)
23	Project success criteria (over and above realisation of benefits)
24	Cost estimates (direct, indirect, operational), indicating sensitivity to underlying assumptions
25	Time estimates (high level) and proposed milestones
26	Resource requirements (people/skills, finance) and their availability
27	Risks (negative and positive): identified and described
28	Risks: analysed with response actions and an estimate of residual cost
29	Contingency/management reserve (cost and time)
30	Organisational process assets (OPA), including lessons learned from past projects
31	Enterprise environmental factors (EEF), mainly internal to the organisation
32	External factors, which may be political, economic, social, technological, legal or environmental
33	Sustainability aspects
34	Relationship to other projects

TABLE 2: Business case information from project planning.

Number	Business case information derived from project planning phase
35	Work breakdown structure (WBS)
36	Revised detailed estimates of cost, time and resources
37	Stakeholder responsibilities (including project team)
38	Quality requirements and non-functional specifications
39	Schedule information showing: dates, duration, dependencies, resources
40	Planned value (PV) control figures for earned value management (EVM) purposes
41	Updated risk information
42	Schedule risk analysis (SRA) – sometimes done late in planning, and repeated periodically

TABLE 3: Business case information for project review.

Number	Business case information required for project review
43	Schedule progress and changes
44	Earned value (EV) at specified dates
45	Actual cost (AC) at a specified dates
46	EVM derived data at specified dates
47	Issues information (title, description, dates, people, alternatives, resolution)
48	Risks, new and updated
49	Decisions record (description, dates, decision-maker)
50	Change control information (change description, benefits, impacts, change status)
51	Regular project information: status, recent progress, short-term plan, major issues and risks
52	End-project info.: achievements, approved changes, time/cost performance, remaining work
53	Lessons learned (ongoing and at end of project)
54	Measurements of business benefits, and assessment of strategic benefits, post-project
55	Cost of termination (only if a review indicates that the project may no longer be justified)

TABLE 4: Business case content elements mapped to 'to-create' information types.

Number	Business case content elements → 'to-create' information type	Executive summary	Reason for project	Alignment with corp. strategy	High-level scope description	Scope exclusions/ limitations	Evaluation of options (feasibility)	Complexity assessment	Expected benefits	Responsibility to achieve benefits	How benefits will be measured	List of risks	Estimated project cost	Estimated operational costs	Target schedule (milestone level)	Investment appraisal	Sensitivity analysis	Funding sources	Resource availability	Assumptions	Constraints + dependencies	Project success criteria	Dis-benefits (impact existing ops.)
1	Project categorisation/type	Y	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	-	-	-	-	-
2	Sponsor and key stakeholders	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	Y	-	-	-	-
3	Project description	Y	Y	Y	Y	-	Y	-	Y	-	-	-	-	-	Y	-	-	-	-	-	-	-	-
4	Business drivers	Y	Y	Y	-	-	-	-	Y	-	-	-	-	-	-	Y	-	-	-	-	-	-	-
5	Business goals	Y	Y	Y	-	-	-	-	Y	-	-	-	-	-	-	Y	-	-	-	-	-	Y	-
6	Business requirements	Y	-	-	Y	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	-
7	Project objectives	Y	-	-	Y	-	Y	-	-	-	-	-	Y	-	Y	-	-	-	-	-	-	Y	-
8	Corp. strategy alignment	Y	-	Y	-	-	Y	-	-	-	-	-	-	-	-	Y	-	-	-	-	-	-	-
9	Alternative options	-	-	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Study or PoC results	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	-	-	-	Y	Y	-	Y
11	Evaluation of options	-	-	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Complexity factors	-	-	-	-	-	Y	Y	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	-
13	Critical success factors	-	-	-	-	-	Y	-	-	-	-	Y	-	-	-	-	Y	-	-	-	Y	-	-
14	Assumptions	-	-	-	Y	-	Y	Y	Y	-	-	Y	Y	-	Y	-	Y	-	-	Y	Y	-	-
15	Constraints or dependencies	-	-	-	-	-	Y	Y	-	-	-	Y	Y	-	Y	Y	-	-	Y	Y	Y	-	-
16	Benefits expected	Y	Y	-	-	-	Y	-	Y	Y	Y	-	-	-	-	Y	-	-	Y	-	Y	Y	-
17	Benefits – value	Y	-	-	-	-	Y	-	Y	-	-	Y	-	-	-	Y	Y	-	-	Y	-	Y	-
18	Benefits – how measured	-	-	-	Y	-	-	Y	-	Y	Y	-	-	-	-	-	-	-	-	-	-	-	-
19	Impact on existing ops.	-	-	-	-	-	Y	Y	Y	-	-	Y	Y	-	-	-	-	-	-	Y	-	Y	Y
20	Project scope	-	-	-	Y	-	Y	Y	-	-	Y	-	Y	-	Y	-	-	-	Y	-	Y	-	-
21	Project scope exclusions	-	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Diagrams	-	-	-	Y	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Additional success criteria	Y	Y	Y	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	-
24	Cost (direct, indirect, ops.)	Y	-	-	-	-	Y	-	-	-	-	Y	Y	Y	-	Y	Y	-	Y	-	Y	Y	-
25	Time/milestones	Y	-	-	-	-	Y	-	-	-	-	Y	Y	-	Y	Y	Y	-	-	-	Y	Y	-
26	Resources – people/skills	-	-	-	Y	-	Y	Y	-	Y	-	Y	Y	Y	Y	-	-	-	Y	Y	Y	-	-
27	Risks	Y	Y	-	-	-	Y	Y	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	Y
28	Risk analysis or response	-	-	-	-	-	Y	Y	-	-	-	Y	Y	Y	-	Y	-	-	-	-	-	-	Y
29	Contingency or mgt. reserve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Org. process assets	-	-	-	-	-	Y	Y	-	-	Y	Y	-	-	-	-	-	Y	Y	Y	Y	-	-
31	Enterprise economic factors	-	-	Y	Y	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	Y	-	-	-
32	External factors	Y	Y	-	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	Y	-	-	-
33	Sustainability aspects	-	-	-	-	-	Y	-	Y	-	-	Y	-	-	-	-	-	-	-	Y	-	Y	Y
34	Relationship to other projects	Y	Y	-	Y	Y	Y	Y	Y	-	-	Y	-	-	Y	Y	-	-	Y	Y	Y	Y	-

that the schedule is overoptimistic, which, in turn, affects risk, and hence the business case. Refer to Table 2-A1 for detailed information on the 'from planning' information category.

Information, for project review, used by business case processes

Information generated during project execution, which is used to monitor progress and to review the business case, is itemised in Table 3.

Herman and Siegelaub (2009) assert that every aspect of the business case can change over time, with the acquisition of additional information. Therefore, the business case must be reviewed periodically to check that it is still viable and justified, using the additional information types from execution. Information would be generated regularly, when required or at defined milestones, and is collectively referred to here as 'for-review' information types (colour-coded pink). They should be used to monitor project progress by comparing them to the project plan which is, in turn, derived from the business case. Information to monitor the project (numbers 43–51) is relevant because any significant deviation from plan, or new issue or risk, might trigger a review of the business case if it causes a key stakeholder to expresses doubts as to the project's ongoing justification. The 'for-review' information types would also be used for gate reviews and other reviews, where the business case is updated and validated (Larson & Gray 2014). An important benefit of tracking is that it allows the business case to be used to guide the project throughout ongoing decision-making. Refer to Table 3-A1 for detailed information on the 'for review' information category.

Mapping of 'to create' information, to business case content elements

In Table 4, the 'to-create' information types are mapped to the business case content elements derived from reference texts (APM 2006; ISACA 2012; ITGI 2008; Messner 2013; OGC 2009; PMI 2017; Vidal, Marle & Bocquet 2011). The fact that each content element is fed by at least one information type serves as a crosscheck that types are not obviously missing. It indicates the more important relationships, but not every possible one, as business cases are contextual, and what applies to one project may not apply to another. Table 4 is created by considering each business case content element (horizontal axis) in turn, and indicating with a 'Y' the likely 'to-create' business case information types (vertical axis) that might be needed to inform it. Thus, to determine which information should be sought to inform one content element, the reader would go vertically down from the content element, and left from every 'Y' to find the likely information types.

Some content elements, like 'evaluation of options', may require many information types for each option considered. Other content elements, like 'funding sources', may require only a few information types. Thus, the mapping shows that there are 'many-to-many' relationships, where one business case information type maps to multiple business content elements and vice versa. The number of relationships, in turn, demonstrates the complexity of the business case, and that judgement is needed to select the most relevant information.

Conclusions and the requirement for future research

From the literature it is concluded that ITB projects, which have unique challenges, have an unsatisfactory success rate. This situation can be improved through project governance, underpinned by business cases, which, if used effectively, ensure the ongoing justification for investments in ITB projects. Business cases, in turn, need well-understood processes and information, for them to be effective. These processes and information types are summarised in the conceptual model given in Figure 3.

The processes from Einhorn and Marnewick (2016) and the information types presented in this article can be put to immediate use to guide project sponsors, other executives and also project management practitioners, who all play key roles in project governance. The information types underline the importance of establishing relationships with stakeholders who must provide the information, as well as the judgement to determine what is relevant. Although the information types covered are in the context of traditional or agile ITB projects, most information types would apply to any project.

Nevertheless, there are avenues for further research. Although it is necessary to understand the business case process groups, and the information that feeds and arises from them, such understanding on its own may be insufficient to engender effective use of the business case. There are many organisational factors that facilitate or inhibit the gathering of information and the business case processes themselves. An example might be the attitude of business users towards providing information, and being fully involved in many aspects of the project. Research into these business case effectiveness factors is therefore a future objective.

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Competing interests

Authors' contribution

F.E. was responsible for the conceptualisation, literature review and drafting of the article. C.M. was responsible for the final review and quality review.

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Appendix 1

Tabulation of information types by category

The following tables give the detail of the business case information types required to create the business case, to plan the project and for project review.

Tables are created by review of papers with theme tags (see 'Literature Review' above) related to business case information. It is not possible to cite all references as some information types, like project risk, are covered in numerous papers.

The column 'Source of Information' indicates the people or documents from which information is obtained. Where 'business case team' is mentioned, it means the person(s) tasked with creating the business case. The column 'Use of Information' illustrates where information adds value during the processes.

TABLE 1-A1: The business case 'to-create' information category.

Number	Type of information	Source of information	Use of information	References
1	Project categorisation or type. For example, Mandatory/Operational/Strategic	Organisation decides on categorisations and assigns them to projects	Guides portfolio balance. May indicate priority, and extent of benefits realisation activity	Crawford, Hobbs and Turner (2005); Larson and Gray (2014); Ross and Beath (2002)
2	Names of sponsor and key stakeholders (including benefit and change owners)	From sponsor and general discussion	Plan communication. Confirm availability of funding	PMI (2013); Ward et al. 2008
3	Project description (high level)	From sponsor or designated project manager or business analyst	Give stakeholders an overview of the project	APM (2006); PMI (2013)
4	Business drivers (corporate imperatives supporting the need for the project)	From sponsor or senior business users	Support the goals, and hence justify the project	OGC (2009); Ward et al. (2008)
5	Business goals (or investment objectives)	From sponsor or senior business users	Confirm the purpose of the project	Ward et al. (2008)
6	Business requirements (high level) or stakeholder expectations	From sponsor, business analyst or other business stakeholders	Expand on business goals, inform high-level scope, and input to functional system specifications	ISACA (2012); Maes et al. (2014)
7	Project objectives (high level)	Agreed between sponsor and business case team	State what the project must achieve, and by when, to support business goals	APM (2006)
8	Corporate strategy alignment	From current corporate strategy statement	States which strategies are supported by the project	Larson and Gray (2014)
9	Alternative options to meet business goals (high level)	From expert input, surveys of available solutions, supplier proposals	Starting point for selecting project approach/concept. For comparison with the 'do nothing' option	Herman and Siegelaub (2009); OGC (2009)
10	Results of a feasibility study, pilot study or proof of concept (PoC)	From reports or from people involved in any earlier feasibility study, pilot study or PoC	Resulting reports feed several information types. They support selection of the preferred option, and allocation of resources	ISACA (2012); Messner (2013); Ward et al. (2008)
11	Results of analysis using financial techniques (like NPV) and non-financial techniques	From analysis by the business case team, or feasibility study team	Provides the basis on which to select and recommend the preferred option	ISACA (2012); Messner (2013)
12	Complexity factors and assessment	From business case team, or feasibility study team	Influence selection of alternatives and identification of risks	Messner (2013); Vidal et al. (2011)
13	Critical success factors (CSFs): inputs that must be in place for the project to be successful at all levels	From discussion with sponsor and stakeholders	Inform the project plan and identify focus areas during planning and execution. Check that CSFs are realistic	Denolf et al. (2015)
14	Assumptions relating to any other information or aspect of the project	From expert input or inferred by the business case team	Allow validation in reviews by stakeholders. Risks may relate to assumptions being incorrect	Messner (2013), Maes et al. (2014)
15	Constraints/dependencies (stated and handled similarly to assumptions)	From expert input or inferred by the business case team	Inform the project plan, and allow regular review of their status	Messner (2013) OGC (2009)
16	Benefits expected (currently or at the time of project approval)	From sponsor and key stakeholders	Informs benefits realisation plan and its assessment. Input to project justification	Herman and Siegelaub (2009); Keen (2011)
17	Benefits: estimated monetary value (where agreed), indicating sensitivity to assumptions	From analysis by business case team based on stakeholder input	Input to financial justification	Messner (2013); OGC (2009); Ward et al. (2008)
18	Benefits: how they will be measured and owned	From the business stakeholders responsible for benefits realisation	Input to project scope, and benefits realisation review	Herman and Siegelaub (2009); Ward et al. (2008)
19	Impact on existing operations (also known as 'dis-benefits')	From business stakeholders and expert input	Input (negative) to justification. May result in mitigating scope actions	Herman and Siegelaub (2009); OGC (2009)
20	Project scope with deliverables (high level), including benefits realisation activities by business	From stakeholders and business case team. Input from business requirements, lessons learned	Informs plan and benefits realisation, including organisational change management aspects	Coombs (2015); Hornstein (2015); Ward et al. (2008)
21	Project scope exclusions (what will not be done in the project)	From the business case team and agreed by the sponsor	Set the boundaries of the project, and stakeholder expectations	APM (2006); Larson and Gray (2014)
22	Diagrams (to clarify any aspect of the project)	From stakeholders and business case team	Help stakeholders to gain a sound understanding of the project	APM (2006)
23	Project success criteria (over and above realisation of benefits)	From stakeholders	Support assessment of project outcomes	APM (2006); Marnewick (2014)
24	Cost estimates (direct, indirect, operational), indicating sensitivity to underlying assumptions	From estimates by experts, typically using analogous or 'reference class' techniques (Flyvbjerg & Budzier 2011; Meyer 2014)	Confirm that project meets financial criteria, to prioritise the project, and to monitor progress from a cost point of view	Herman and Siegelaub (2009); Messner (2013); Ward et al. (2008)
25	Time estimates (high level) and proposed milestones	From scope, resource availability and dependencies. Influenced by business need	Give initial understanding of main project events with planned dates, and also input to related projects	Herman and Siegelaub (2009); ISACA (2012)
26	Resource requirements (people/skills, finance) and their availability	From scope, with input from resource owners and sponsor	Informs feasibility, cost, preferred option, and timing of project	IPMA (2009); PMI (2013)

Table 1-A1 continues on the next page →

TABLE 1-A1 (Continues...): The business case 'to-create' information category.

Number	Type of information	Source of information	Use of information	References
27	Risks (negative and positive): identified and described	From stakeholders and risk tools or checklists	Input to risk analysis and resulting in response actions	Herman and Siegelaub (2009); Thamhain (2013)
28	Risks: analysed with response actions and an estimate of residual cost	By business case team and risk specialist	Included in cost estimates and input to the planning risk register	PMI (2013); Ward et al. (2008)
29	Contingency/management reserve (cost and time)	From qualitative or quantitative risk analysis	Results in budgeted amounts at project or sponsor level	PMI (2013); Uzzafer (2013)
30	Organisational process assets (OPA), including lessons learned from past projects	From knowledge of the organisation, including internal processes and historical records	Input to evaluation of options, decisions and plans	Disterer (2002); PMI (2013)
31	Enterprise environmental factors (EEF), mainly internal to the organisation	From knowledge of the organisation, like culture and governance	Input to evaluation of options, decisions and plans	PMI (2013)
32	External factors, which may be political, economic, social, technological, legal or environmental	From formal fact finding or tacit knowledge of stakeholders	Input to evaluation of options, decisions and plans	Cadle, Paul and Turner (2010); Herman and Siegelaub (2009)
33	Sustainability aspects	From stakeholder view of ongoing people, financial, environmental factors	Influences assessment of benefits and the approach to achieve them	Silvius and Schipper (2014)
34	Relationship to other projects	From programme and portfolio management	Input to plans for other projects and resource utilisation	Messner (2013); OGC (2009)

Note: Please see the full reference list of the article, Marnewick, C. & Einhorn, F., 2019, 'The business case thrives on relevant information', *South African Journal of Information Management* 21(1), a978. https://doi.org/10.4102/sajim.v21i1.978, for more information.

TABLE 2-A1: The business case 'from-planning' information category.

Number	Type of information	Source of information	Use of information	References
35	WBS (work breakdown structure)	Produced by the project manager with team input Often done iteratively via 'rolling wave planning'	Validate the scope, and hence estimates of time and cost	IPMA (2009); Nelson and Morris (2014)
36	Revised detailed estimates of cost, time and resources	Based on the WBS using 'bottom-up' approaches, or sometimes from a parametric model	Update time and cost baselines. Give input to PV (planned values) for EVM tracking	OGC (2009)
37	Stakeholder responsibilities (including project team)	Maintained by the project manager, possibly as a chart	Ensure that all roles are understood and filled with people with suitable skills	APM (2006); PMI (2013)
38	Quality requirements and non-functional specifications	From stakeholders through quality workshops	Input to scope, cost, and time baselines, also to resource requirements	ISACA (2012); PMI (2013)
39	Schedule information showing: dates, duration, dependencies, resources	From the WBS, broken down further to activities, and application of durations and resources	Validate/update milestones in business case	PMI (2013)
40	Planned value (PV) control figures for EVM purposes	From time-phased budget, for part or all of the project	Used with EV (earned value) to monitor schedule/cost performance, using variances and indices	Brandon (1998); PMI (2013)
41	Updated risk information	From planning activities	Update risk register and business case	Thamhain (2013)
42	SRA (schedule risk analysis), a study sometimes done late in planning, and repeated periodically	From activity schedule, and duration probability distributions	Helps to identify critical/sensitive activities, and highlight schedule risks	Vanhoucke (2010)

Note: Please see the full reference list of the article, Marnewick, C. & Einhorn, F., 2019, 'The business case thrives on relevant information', *South African Journal of Information Management* 21(1), a978. https://doi.org/10.4102/sajim.v21i1.978, for more information.

TABLE 3-A1: The business case 'for-review' information category.

Number	Type of information	Source of information	Use of information	References
43	Schedule progress and changes	From regular progress tracking	Input to EV estimates	PMI (2013)
44	Earned value (EV) at specified dates	Estimated by PM with input from schedules, as a measure of achievement to-date (using PV as a yardstick)	Used to determine cost and schedule variances and indices, and/or 'earned schedule'. Feeds regular reports	Brandon (1998); PMI (2013)
45	Actual cost (AC) at a specified dates	From project accounts, supplier invoices, timesheets and rates per individual	Used with EV to determine cost variances and indices. Hence track cost performance. Feeds regular reports	Brandon (1998); PMI (2013)
46	EVM derived data at specified dates	CPI, SPI (cost, schedule performance indices) and CV, SV (cost, schedule variances) are derived from EV, PV and AC	Used to monitor progress, estimate % completion, and forecast completion date and costs. Feeds regular reports	Brandon (1998); PMI (2013)
47	Issues information (title, description, dates, people, alternatives, resolution)	From stakeholders, and owned by project manager	Allows issues to be recorded, managed, and reported. Some issues may affect project viability	OGC (2009); Thamhain (2013)
48	Risks, new and updated	From any stakeholder during ongoing project activity	Update risk register and monitor response actions. Selected risks are reported	OGC (2009); Thamhain (2013)
49	Decisions record (description, dates, decision-maker)	From sponsor decisions, business case reviews, or meeting minutes	Inform stakeholders and ensures common understanding	Larson and Gray (2014)
50	Change control information. (change description, benefits, impacts, change status)	From any stakeholder, and managed between sponsor and project manager	Allows changes to be tracked and reported on. Explains changes to scope, schedule and cost baselines, and hence business case changes	OGC (2009); PMI (2013)
51	Regular project information (including status, recent progress, short-term plan, major issues and risks)	From PM informed by records and project team, often in the form of a dashboard or project report	Keep stakeholders informed. Trigger review action when needed. Provide project history for reviews	OGC (2009); PMI (2013)
52	End-project information (including achievements, approved changes, time and cost performance, remaining work)	Produced by project manager, often in the form of an 'end-project report'	Informs all stakeholders. Input to future related projects	OGC (2009); PMI (2013)
53	Lessons learned (ongoing and at end of project)	From project reviews or stakeholder input	Used to inform future activities, and future projects (e.g. potential risks)	Herman and Siegelaub (2009); PMI (2013)
54	Measurements of business benefits, and assessment of strategic benefits, post-project	By business users, during benefits and post-implementation reviews, guided by benefits plan	Allows sponsor and executive management to gauge project success	Herman and Siegelaub (2009); OGC (2009)
55	Cost of termination (only if a review indicates that the project may no longer be justified)	Investigation taking into account contractual, human, and risk factors. Also the effect on related projects or parts of the business	Input to decision whether to continue, change or terminate the project	Meyer (2014)

Note: Please see the full reference list of the article, Marnewick, C. & Einhorn, F., 2019, 'The business case thrives on relevant information', *South African Journal of Information Management* 21(1), a978. https://doi.org/10.4102/sajim.v21i1.978, for more information.