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Information Paper

Quality Management of Statistical Processes Using Quality Gates

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INTRODUCTION

PREAMBLE

The Australian Bureau of Statistics (ABS) is Australia's official statistical agency. It is committed to leading a high quality statistical service to assist and encourage informed decision making. A key function of the ABS is to provide statistical leadership in developing and assisting to implement standards used in statistical processes undertaken by official bodies.

Statistical collections are often exposed to the risk that one or more of the components of the process fail to meet the quality standard expected, such that the quality or the integrity of the statistical outputs are affected. In this paper we refer to this kind of risk as "statistical risk". Statistical risk arises for various reasons, some of which may include inadequate inputs, processes not being well defined, changes to existing processes, or human error.

The purpose of this paper is to introduce a new approach to managing statistical processes. This framework provides a systematic approach for assessing the quality of the statistics at specific points in the process, such that the overall quality of outputs are fit for their intended purposes. Agencies involved in collecting, processing, analysing or disseminating statistics will be able to apply the framework for mitigation against statistical risks in statistical processes.

INTRODUCTION

Among national statistical agencies it has long been acknowledged that "confidence in the quality of the information it produces is a survival issue for a statistical agency" (Brackstone 1999). However, given the amount of data that a statistical agency handles each and every day, the risk of releasing incorrect statistics to the public and the subsequent loss of confidence in the organisation by users for this type of error is very real.

Errors in statistical outputs can be minimised by committing to quality management strategies, such as risk management. Risk management is concerned with identifying potential risks, analysing their consequences, and devising and implementing responses, ensuring that corporate and business objectives are achieved while upholding quality.

The Australian Bureau of Statistics (ABS) leads Australia's national statistical service, running hundreds of surveys and publishing thousands of pages of output every year. As with any large and complex organisation, problems with processes do arise and the ABS has suffered errors in their data in the past with varying degrees of impact on the public domain. Most errors are detected in-house before publication, however this has at times resulted in intense last-minute work to correct the problems leading to delays in the release of data. Other errors have only been discovered after release, resulting in re-issue of statistical output. As a result of these errors the ABS has endeavoured to instigate better quality management practices through the development and use of the risk mitigation strategy known as quality gates.

Quality gates are designed to improve the early detection of errors or flaws in production processes. Specifically, the principles that underpin the quality gates framework are:

- Quality of statistical processes should be managed in a holistic manner i.e. Total Quality Management;
- Quality management and assessment of fitness-for-purpose of statistical processes should be evidence based;
- Any problems arising in statistical processes should be detected as early as possible;

INTRODUCTION *continued*

- Roles and responsibilities in the management of process quality should be clear and explicit;
- Knowledge and information about specific stages of a statistical process should be documented and shared; and
- Regular evaluation should capture lessons learnt and lead to continuous improvement of quality management of statistical processes.

The concept of quality gates is not a new one. It has been used in other fields for many years such as the automotive and information technology industries. In the ABS, quality gates consist of six components which distinguishes them from more general every day risk management strategies. The six components of a quality gate are Placement, Quality Measures, Roles, Tolerance, Actions and Evaluation. This paper describes in more detail the quality gate framework to enable its use as a statistical risk mitigation strategy primarily for statistical processes. In particular, the paper provides an explanation of each of the six components of a quality gate, followed by examples and templates to assist agencies to apply the framework.

SIX COMPONENTS OF QUALITY GATES

Quality gates can be used to improve the visibility of quality in the production process as well as being used to measure and monitor quality in real time at strategic points. Quality gates consist of a set of acceptance criteria imposed at predetermined points in a production process whereby each of the components (Placement, Quality Measures, Roles, Tolerance, Actions and Evaluation) play an important part in determining the fitness for purpose of the process.

Quality gates are designed to facilitate the detection, discussion and resolution of issues and problems through a collaborative effort to improve the quality of products.

PLACEMENT

"Placement" is the first component of a quality gate. It refers to the placement of quality gates throughout a statistical process (also known as a business process cycle, or statistical process cycle). Placement of a quality gate is determined by the level of risk associated with given points in the production process. Specifically, the placement of a quality gate should occur where a risk assessment of the process reveals that there is a need for a quality gate due to the impact on the process and statistical outputs that would occur if the risk was realised.

In determining where to place quality gates it is important to ask the questions:

- What can go wrong?
- When can it occur?
- What impact can it have?

Along with thinking about the inherent risks, it is helpful to draw a basic map of the production process that is to be monitored which can also help in determining placement of a quality gate. Mapping processes helps users understand how a system works and identifies how a system interacts with other systems and processes. For example, it will help users determine interdependencies with one another in the production of statistics. Mapping the statistical process provides a simple conceptual framework to identify logical and key areas where quality gates can be used to monitor quality.

The ABS uses the Generic Statistical Business Process Model (GSBPM) as a guide to map the activities of statistical processes against. This is done to ensure all aspects of the statistical process are included for monitoring purposes. For example the "Collect" phase of the GSBPM would include activities related to obtaining data. This could include interviewing respondents, obtaining data from an administrative source, interviewer training, sample monitoring etc., depending on the nature of the statistical process being mapped.

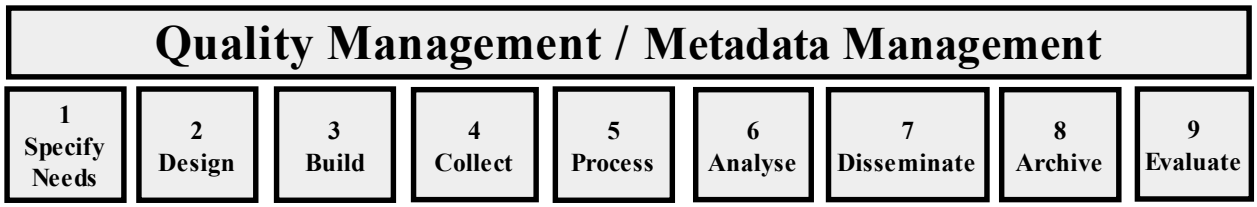


Figure 1 - Taken from the Generic Statistical Business Process Model (Vale, 2009)

The above diagram could be simplified further to "Input, Process, Output" for mapping against. This simplification may be beneficial to agencies where statistical operations are not their primary function.

PLACEMENT *continued*

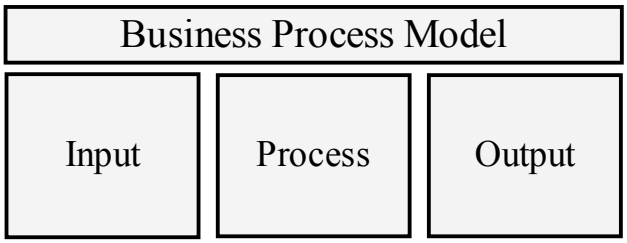


Figure 2 - Simplified Business Process Model

By identifying the key activities associated with each step of the statistical process, an assessment of whether there are any risks in those steps can be made up front. This assists with determining where best to place quality gates.

Some common risky areas in a process include:

- Hand-over or integration of data between multiple areas;
- Data transformation; and
- Changes to processes, methods and systems.

It is important when considering placement of the quality gates that each gate is placed as early in the process as possible to allow early detection of issues. This promotes greater efficiencies as errors are picked up earlier in the process and resolved in a timely fashion. However, when positioning quality gates the impact of time constraints on the overall production of the statistics needs to be taken into account. This means that there is a limit to the number of quality gates that can be effectively implemented in any given process due to deadlines.

The ABS has an overarching Risk Management Framework, based on the International Risk Management Standard ISO 31000:2009, which details the ABS approach to risk management. The ABS has adapted this Risk Management Framework to suit the business needs of the organisation. One such adaptation of this Risk Management Framework is the ABS' Statistical Risk Management Framework (see below). It cross classifies the levels of "Likelihood" (chance of the risk occurring) and "Consequence" (effect on the immediate process or statistical outputs of the risk occurring) to reveal an overall assessment of the statistical risk which could be either Low (L), Moderate (M), High (H) or Extreme (E).

ABS Statistical Risk Management Framework

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	**M**	**H**	**H**	**E**	**E**
Likely	**M**	**M**	**H**	**E**	**E**
Possible	**L**	**M**	**H**	**E**	**E**
Unlikely	**L**	**L**	**M**	**H**	**E**
Rare	**L**	**L**	**M**	**H**	**H**

Where a statistical risk assessment reveals that the risk rating is extreme or high it is recommended that a quality gate be utilised to mitigate the statistical risk. For medium risk ratings it may be useful to utilise additional quality measures in existing quality gates that assist in monitoring the aspects which will highlight if the process isn't working correctly. Routine procedures are generally sufficient for the monitoring of low risk ratings. More information on the ABS' Statistical Risk Assessment Framework can be found in the Appendix. It is worth noting that each organisation will have their own risk matrix based on their tolerance for risk and that the ABS' Statistical Risk Assessment Framework may not be suitable for use by other organisations depending on their needs.

It is also important to note that the placement of a quality gate may be different for each production process and that the impact on the immediate process and overall quality of the statistical outputs are key pieces of information to assist in the placement of quality gates.

Along with these considerations it is worth keeping in mind that all quality gates used to monitor one statistical process cycle may not be controlled by one area alone. It may be that there are several areas (such as in the case of a hand-over situation) that have responsibility for the development, maintenance and assessment of quality gates for a particular part of the statistical process.

QUALITY MEASURES

The second component of a quality gate is "quality measures". Quality measures are a set of indicators that provide information about potential problems at a given point in the process. When determining what quality measures should be included in a specific quality gate it is important to consider the risks and what information would be required in order to make an assessment about fitness for purpose at that point in time. That is, what quality measures are going to reveal if there is a problem with the process. Along with thinking about the immediate needs of the process it is important to keep in mind the outcomes that are required from the process to ensure that these can be met through use of appropriate quality measures.

A quality gate may have multiple quality measures which assist in determining problems in the process. Observing the quality measure as a time series may be of benefit to ensure that business as usual is being observed. It is also recommended that each quality measure within a particular quality gate is mutually exclusive (see ABS Experience section).

Using common or shared definitions where possible for quality measures is encouraged. Where a common definition is not appropriate it is important to ensure that the quality measure is thoroughly documented so that no misunderstandings occur. Often simple errors occur in processes because common knowledge of that particular process is assumed to be held by all parties involved. Documenting the definitions used for the quality measures is an important part of knowledge management for a quality gate.

It is important to specify the level of detail required for a quality measure. For example, instead of examining the response rate at the Australia level only the quality measure may require the response rate for a particular State or Territory. Drilling down to more detailed information may reveal issues with the process that are not apparent at higher levels. Historical information of the process can be used to determine if there are any known issues that should be monitored along with the initial risk assessment. Please note that a quality measure may not itself identify a specific problem in the process but it will report on symptoms which may indicate that something is not right and further investigation is required. It is also important to note that the source of a quality measure may be different to the source of the problem. When thinking about quality measures it is useful to also consider what it is about the process that they are revealing as it may not be a straight forward one to one link.

Not every detailed check that is undertaken in a process will constitute an individual quality measure, however they may be utilised by quality measures. An example of this is a check list of the different ways a data set is validated (e.g. internal consistency checks, non-zero values, number of records in is equal to number of records out) which may not in itself be a quality measure but combined with other detailed checks it may form a part of a quality measure.

As with any monitoring activity it is useful to prioritise the quality measures in terms of their level of importance in ensuring the quality of the process. This is because quality gates are labour intensive and there is a cost to benefit trade off assessment that needs to be made in order to achieve high quality outputs in a timely manner. That is why it is important to choose good indicators (quality measures) of potential problems. The identification of good quality measures will become more apparent with experience and practice in using quality gates over time.

ROLES

The third component of a quality gate is "roles". This component involves assigning tasks to various people or areas involved in the operation of a quality gate. Roles identifies areas or people who are directly connected to the quality gate and its operation, along with people or areas who are affected by issues with the process. It is important to make sure that people or areas dependent on the successful outcome of the process, who are not directly involved, are included in roles as stakeholders. This is so they can be informed of any issues identified from the quality gates that may impact on their work.

The key roles for a quality gate have been identified as:

- An operational person (gate keeper);
- Stakeholders; and
- A sign off person(s).

Each of these roles plays an important part in the quality gate process.

The operational person, known as the gate keeper, is the person responsible for compiling the information for the quality gate. Their role includes documenting the quality gate and populating the information within the gate as the process unfolds. The gate keeper is also responsible for ensuring that all roles are completed on time.

There are two types of stakeholders. The first type of stakeholder is the giver or giving stakeholder. They are the stakeholders responsible for providing the information specified by the quality measures. These stakeholders need to be aware of the definitions being utilised within the quality gate in order to provide the right information. It is also important that all responsibilities are clearly negotiated at the creation of a quality gate to ensure that the correct information is supplied in a timely manner when the quality gate is reached. It is also worth noting that these stakeholders may be in another area to that of the process that is being monitored. In these cases it is important to not duplicate the efforts of other stakeholder areas in the quality gate.

The second type of stakeholder is that of the receiver or receiving stakeholder. They are the stakeholders whose work may be affected by any issues identified in the process. These stakeholders play a different role in the overall quality management of a process depending on the impact of a quality gate assessment. For example, if one area is dependent on data from another area, it is advisable to have the dependent area as a stakeholder that is informed of any delays or issues in the process that may directly impact on their ability to do their work.

A sign off person is independent of the compilation of the quality gate. They examine the information presented within the quality gate and make a decision as to whether the process can proceed to the next stage. A sign off person may be a manager who has not been directly involved with the process. This promotes a fresh examination of the data presented from a quality gate in order to make an informed decision. A risk with any process is that people closely involved may not be able to see obvious issues, which is why it is strongly recommended that an independent person to the process has the role of sign off. Depending on organisational requirements there could be more than one sign off person for the quality gates in a statistical process.

TOLERANCE

"Tolerance" is the fourth component of a quality gate. Tolerance refers to an acceptable level of quality. The acceptable level could be qualitative (e.g. Yes/No) or quantitative (e.g. 97%).

Tolerance levels or thresholds are generally set by expectations of what should be observed at that point in the process for a given quality measure. The thresholds provide a range of what is acceptable quality and may have different levels of acceptance.

A powerful aspect of this component is that expectations are set in advance of the process occurring, that is they are predetermined. This prevents an erosion of quality over time because potential minor problems or changes in quality will be identified which may not have been if expectations about the level of quality had not been considered prior to the decision point.

ACTIONS

"Actions" is the fifth component of a quality gate. Actions are predetermined responses to various outcomes for a quality gate. They provide a definition of what will be done if threshold or tolerance levels are met or not met with regards to each quality measure. In particular the actions associated with each quality measure need to take into account the severity of the result on the end product or other quality measures and gates if the threshold or tolerance levels are not met.

Questions which may help clarify the actions to take for a quality measure depending on the tolerance levels are:

- What needs to be done if there is a problem?
- Who needs to be informed?

A suggested way of determining the actions to take is to consider a traffic light (Red, Amber and Green) and the subsequent degree of severity of the action depending on the colour of the light. The traffic lights will correspond to a tolerance level that determines the level of acceptability. The ABS' Statistical Risk Assessment Framework in the Appendix may be of use when determining the severity of the action required.

The traffic lights and their potential actions are:

- Green light: occurs when the threshold or tolerance levels have been met and there are no issues with the process at that point in time. This indicates that processing can move to the next stage.
- Amber light: occurs when the threshold or tolerance levels indicate that there may be a problem. This might be that the level achieved for a quality measure at that particular point in time is slightly outside the range of the predetermined level of acceptability. It is advised that investigations should occur to determine if there is a problem or not and to continue cautiously to the next stage of the process whilst the investigation is underway. The amber investigation should ensure that if there is no problem with the process or data that the unexpected result is explained fully.
- Red light: occurs when the threshold or tolerance levels are not met. That is, major issues are identified with the process. This means that the process must stop so that the issues can be investigated and resolved before proceeding to the next step. This may involve returning to the last known place in the process where everything was okay (i.e. the last quality gate) and processing the data from that point forward. This would include applying the required fixes to ensure that the process is correct at the next quality gate. The red light action will vary depending on the severity and timing of the issue that has been identified. In some cases having an already developed contingency plan may be an advisable red light action to take because of the severity of the issue and the time available to fix it.

EVALUATION

The final component of a quality gate is Evaluation. As with any process that is undertaken an evaluation or review should occur to examine where improvements can be made for future use.

At the end of each statistical process cycle is it recommended that the quality gates should be evaluated to determine what worked well, what didn't and where improvements can be made. It is useful to consider whether the information provided by the quality gates provided enough information to make informed decisions.

Potential improvements for quality gates may include but are not limited to:

- An assessment of the benefit of all the quality measures within each quality gate compared to the cost of having them;
- Adjustments to tolerance levels;
- The addition of quality measures not specified previously;
- The removal of quality measures not considered useful;
- The removal of a quality gate because it does not add value or is not required; and
- An adjustment to all of the components of a particular quality gate based on the experience of the process of using them.

Evaluation of quality gates consolidates the final reporting on the quality of the statistical process cycle. The subsequent documentation and knowledge management that occurs due to this explicit review of the entire statistical process cycle assists with maintaining confidence in the quality of the statistical output produced.

BENEFITS OF QUALITY GATES

The benefits of implementing quality gates outweigh the initial costs associated with their creation. Some of these benefits include:

- The provision of a model of accountability and responsibility for production processes;
- The ability to detect problems early on in the process so they can be rectified;
- Predetermined expectations of acceptable levels of quality;
- Documentation and monitoring of issues and actions throughout the production cycle; and
- The creation of a store of corporate knowledge.

The provision of a model of accountability and responsibility for production processes

Each quality gate contains the roles and responsibilities held by an individual or area which has been agreed to by all stakeholders. It provides a record of when each quality measure is required so that work priorities can be planned. Quality gates are not a tool for placing blame, they engender ownership of the entire statistical process including its quality by the various stakeholders.

The ability to detect problems early on in the process so they can be rectified

Quality gates are placed at strategic places throughout a process to identify errors or problems earlier. The explicit monitoring of the process at these given points in time ensures that known statistical risks are mitigated. Hence, any issues are fixed at early stages in the process rather than only identified at the end when it is often too late to be able to change the impact on the outcome. Efficiencies in both time and money are realised through the earlier detection and resolution of errors. It is more cost effective to fix a problem when it first occurs than at a later date which may involve months of work that will need to be re-done.

Predetermined expectations of acceptable levels of quality

The provision of tolerance or threshold levels allow expectations to be documented well in advance of the process being undertaken. This ensures that quality is not eroded over time because of a continual slight decrease in quality from one statistical process cycle to the next not being identified. Having predetermined expectations and subsequent actions to be undertaken if particular situations arise ensures that quality is maintained and fully considered in potentially stressful situations.

Documentation and monitoring of issues and actions throughout the production cycle

Quality gates ensure issues are closely monitored and documented by functioning as check points where all critical items or documentation are examined to determine whether they meet the requirements for the next stage of processing.

The creation of a store of corporate knowledge

Due to the documentation of issues and actions throughout the production process there is a record of knowledge and information that can be used in future processes. These records provide information on what went wrong and how it was fixed. This information is useful for quality management of subsequent cycles of the process.

QUALITY GATES AND THE ABS DATA QUALITY FRAMEWORK

In May 2009, the ABS Data Quality Framework was released on the ABS website. The focus of that information paper was on the application of the ABS Data Quality Framework for use in activities relating to assessment of statistical outputs (quality about a product), using the seven dimensions of quality. However, the ABS Data Quality Framework can also be applied to other aspects of organisational quality including the Institutional Environment, statistical processes and statistical inputs (Eurostat 2009).

This paper discusses the aspect of managing the quality of statistical processes using quality gates. Quality gates link back to the ABS Data Quality Framework dimensions of Institutional Environment, Relevance, Timeliness, Accuracy, Coherence, Interpretability and Accessibility to ensure that all dimensions of quality have been considered and maintained in the production of the statistical outputs. Quality gates do this through their creation and use.

For example quality gates reflect:

- Institutional environment through their implementation as a statistical risk mitigation strategy, so that the reputation of the organisation is protected;
- Timeliness and Relevance by ensuring that they are placed at appropriate junctures in the process where they can influence the direction and outcome of the quality of the process. For example: preventing delays by identifying problems in time, confirming that the process is okay at a given point in time in order to continue to the next steps, or confirming that the output requirements are achievable from the design of the inputs;
- Accuracy and Coherence through the use of quality measures and their corresponding tolerance levels;
- Interpretability by encouraging documentation to ensure knowledge management and a shared understanding across all stakeholders of the quality gate and the underlying processes; and
- Accessibility through the provision of information on the quality of the process at the individual components. In some cases the desired information, for example a particular quality measure, may not be available due to current reporting limitations in the processes, but is something that should still be acknowledged as a requirement for future development opportunities.

THE ABS EXPERIENCE IN THE IMPLEMENTATION OF QUALITY GATES

THE ABS EXPERIENCE IN THE IMPLEMENTATION OF QUALITY GATES

The ABS is in the process of implementing quality gates throughout their collection processes. Although formal quality gates have not yet been implemented in all ABS processes, they are all quality assured with quality gates being a formalisation of the checks that are already undertaken by areas. However, early implementers of quality gates within the ABS have identified issues that should be considered when developing quality gates. The issues that have been identified for consideration are:

- Dedicated resources for the review and development of quality gates;
- Limiting the number of quality gates;
- Eliminating duplication of gates;
- Quality measures should be mutually exclusive;
- Consultation with stakeholders; and
- Placement of quality gates at critical control points.

Dedicated resources for the review and development of quality gates

It is important that adequate resources are dedicated to the development and subsequent evaluation process of quality gates. Having adequate resources to undertake this work is key to developing the quality gates as a considerable amount of effort is required to identify the risks and subsequent components of quality gates upon initial development. It is useful to consult with all stakeholders in the development phase of the quality gate to ensure that all avenues of quality at a particular point in time in a process are covered.

Limiting the number of quality gates

It is important to limit the number of quality gates that are to be implemented within a process. "The introduction of too many gates, or gates at inappropriate junctures will only serve to slow the process down and may ultimately devalue all quality gates" (Schubert et al. 2007). The time taken to complete an evaluation of a quality gate varies depending on the number and complexity of the quality measures contained within the gate. In general, a process with five quality gates requires less resources to complete the evaluation than a process with ten gates. It was found that many of the quality gates that are proposed in an initial consultation can be amalgamated into a few quality gates after realising that the identified risks are quality measures rather than themselves quality gates. Thus, decreasing the number of quality gates needed in the process.

Eliminating duplication of gates

Separate quality gates should not be created for each stakeholder type as it increases administrative burden. For example, where data is handed over from one area to another in the statistical process cycle the same quality gate should be used for each stakeholder. Each stakeholder would be assigned their roles in regards to the quality measures and delivery of information for that quality gate that they need to provide. This eliminates any potential duplication of effort because each stakeholder is aware of other stakeholder requirements for the quality gate. Furthermore, quality gates can be used for more than one particular process. It may be possible to create standard quality gates that can be used across all processes with only minor adjustments of some of the components (e.g. tolerance levels).

THE ABS EXPERIENCE IN THE IMPLEMENTATION OF QUALITY GATES *continued*

Quality measures should be mutually exclusive

It is important to make sure that each quality measure within a quality gate is independent of each other, that is, mutually exclusive. If quality measures are dependent on one another then the failure of one quality measure will automatically affect the success of the dependent quality measure. It is important to have quality measures that are mutually exclusive to eliminate the duplication of work as well as having quality measures that are each effective in identifying if there are problems with the processes. There may be certain types of manipulations that occur to the data during the process that require quality measures to be repeated in subsequent quality gates. This might be due to changes to data that may alter a quality measure's status from that of a green light to that of a red. In these cases it is important to repeat the use of quality measures in subsequent quality gates to ensure the quality of the process.

Consultation with all stakeholders

Quality gate stakeholders will vary from one gate to another. It is important to ensure that all relevant stakeholders to a quality gate are consulted with to ensure that the best quality gate is developed for monitoring purposes. These stakeholders may include staff working on a particular aspect of the process, managers of the process and other clients. Involvement of stakeholders should occur from the initial development of the quality gate. A workshop with the relevant stakeholders to flesh out the requirements of the quality gate is recommended initially with follow up meetings as required. These subsequent meetings can be either with individual areas or collectively during the development of the quality gate.

Placement of quality gates at critical control points

"Quality gates should be located at points in time when critical decisions need to be made in order to advance the project" (McKinsey & Company). The purpose of quality gates is to ensure that all required material is available before a process can continue, which emphasises the importance of placing the gates at key strategic point to aid in the identification of issues. Although some criteria may not adversely impact the final output, they do affect the overall quality of the end product. If quality gates are not placed at these key strategic points the issue may not be evident until the process is too advanced for problems to be fixed.

EXAMPLE OF A GENERIC QUALITY GATES TEMPLATE

EXAMPLE OF A GENERIC QUALITY GATE TEMPLATE

The below templates are for consideration when developing a quality gate. They provide a structure that can be used to help in the monitoring and documentation of quality gates. Not all sections of the template may be applicable. It is up to each individual to determine what is appropriate for their circumstances.

Checklist for a quality gate

1. Simple business process map of process

2. Placement

3. Risk assessment of process
   - What can go wrong?
   - When can it occur?
   - What impact can it have?

4. Quality Measures
   - How would we know if something was wrong?

5. Roles
   - Who is responsible?
   - Who will this affect?

6. Tolerance
   - What is an acceptable level of quality?

7. Actions
   - Traffic light concept
   - What will we do if there is a problem?
   - Who needs to be informed?

8. Evaluation
   - What has this information told us about our quality?
   - How can we improve in the future?

Quality Gates Template

The following Quality Gates Template is also available in an excel format from the downloads page.

Quality Gate Definition Document				
Quality Gate Name:				
Placement*:				
Quality Measures	**Source ****	**Due Date**	**Complete (Yes/No)**	**Comments / Changes [Evaluation]**
* Placement should be linked to business process model / statistical process cycle				
** Source should indicate where to locate the quality measure				

Quality Measures Definition Document - Quantitative Quality Measures (e.g. 97%)		
Name of Quality Measures		
Description		
Why we need the measure	[What aspect of the process / collection does this measure tell us about that we wouldn't otherwise know?]	
Where		
Quality Gate	[What quality gate does this measure feed into?]	
Level	[What level of detail do we require this measure at? e.g. Industry sub-division, state, local government, etc.]	
Calculation		
Formula	[How is the measure calculated?]	
Frequency	[How often does this measure need to be calculated? e.g. daily, weekly, monthly, etc.]	
Scope	[Are there any specific inclusions or exclusions from your measure?]	
Reference	[Is there a paper that provides more information / background on this 'definition'?]	
Standard	[Is the formula and definition a standard used by the organisation or an international organisation?]	
Data Items used in formula	Description	Source / Availability
[name]		
[name]		
[name]		
[name]		

Presentation of quality measure	
Monitoring	[How are you going to 'track' the quality measure to see if everything is okay? e.g. percentage change from one period to another, trend over time, etc.]
Frequency	[What is the frequency that we wish to use in our monitoring / display for reporting?]
Display	[How are we 'displaying' the Quality Measure? e.g. graph, table]
Tolerance	[What are the threshold or tolerance levels for this quality measure and when is the measure being assessed against these?]
Actions	[What are the actions that need to be taken depending on the quality measure and where it fits within the tolerance? i.e. Red, Amber and Green actions.]
Roles	
Owner Area / Gate Keeper	[Who is responsible for monitoring this quality measure?]
Provider Stakeholders	[Who are the people or areas responsible for providing the information that feeds into this quality measure, or providing the quality measure? This includes those persons responsible for the calculation as well.]
Other Stakeholders	[Who or what areas may need to be contacted if there is a problem identified with the process by this quality measure?]

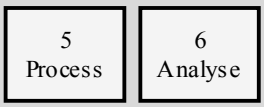
Quality Measures Definition Document - Qualitative Quality Measures (e.g. Yes/No)	
Name of Quality Measures	
Description	
Why we need the measure	[What aspect of the process / collection does this measure tell us about that we wouldn't otherwise know?]
Where	
Quality Gate	[What quality gate does this measure feed into?]
Level	[What level of detail do we require this measure at? i.e. what checks feed into this quality measure?]
Tolerance	[What are the threshold or tolerance levels for this quality measure and when is the measure being assessed against these?]
Actions	[What are the actions that need to be taken depending on the quality measure and where it fits within the tolerance? i.e. Red, Amber and Green actions.]
Roles	
Owner Area / Gate Keeper	[Who is responsible for monitoring this quality measure?]
Provider Stakeholders	[Who are the people or areas responsible for providing the information that feeds into this quality measure, or providing the quality measure?]
Other Stakeholders	[Who or what areas may need to be contacted if there is a problem identified with the process by this quality measure?]

Quality Gates Example

Quality Gate Definition Document

Quality Gate Name: QUALITY GATE NUMBER 5

Placement*: Falls within the 'Process' and 'Analyse' sections of the business process model



Quality Measures	Source **	Due Date	Complete (Yes/No)	Comments / Changes [Evaluation]
QM1 - percentage change key series	s:/section drive/quality gates 5/QM1	30th September 2010		28/09/2010 QM1 has not been finalised yet. Currently an Amber light. Investigating a larger than expected change in data items
QM2 - validation of publication	s:/section drive/quality gates 5/QM2	20th September 2010	Yes	

* Placement should be linked to business process model / statistical process cycle

** Source should indicate where to locate the quality measure

Quality Measures Definition Document - Quantitative Quality Measures (e.g. 97%)		
Name of Quality Measures	QM1 - Percentage Change Key Series	
Description	Percentage change from 2009 to 2010 of key series of interest	
Why we need the measure	This measure helps to ensure consistency of data with previous releases and ensures that any unexpected increases or decreases are investigated to ensure it is a 'true' movement and not an error in the process.	
Where		
Quality Gate	Quality Gate 5	
Level	Each of the below key series: Data Item A Data Item B Data Item C Data Item D cross classified by State / Territory; State / Territory x Industry	
Calculation		
Formula	Percentage change = ((current - previous)/previous))*100 e.g. ((data item A 2010 - data item A 2009)/(data item A 2009))*100	
Frequency	The measure will be calculated once the data has been processed.	
Scope	No there are no exclusions to the key series that need to be mentioned.	
Reference	Not applicable.	
Standard	Not applicable.	
Data Items used in formula	Description	Source / Availability
Data Item A	Data item A is an input item from the collection.	
Data Item B	Data item B is compiled from questions 29 and 30 of the collection. Please see: S/section drive/Data Items/ for more information on the questions and their combinations into the data item.	
Data Item C	Data item C is an input item from the collection.	
Data Item D	Data item D is an input item from the collection.	

Presentation of quality measure	
Monitoring	We will use a percentage change from the previous year's release. We will compare this with the previous 5 years worth of percentage changes in these series to observe the appropriate tolerance levels.
Frequency	A time series of the last 5 years worth of these percentage changes.
Display	The Quality Measure will be displayed in a spreadsheet which will have a formula that will identify those percentage changes that are outside the appriopriate tolerance levels.
Tolerance	A percentage change of between 0-7% inclusive is Green light A percentage change of between 8-14% inclusive is Amber light A percentage change of between 15-22% inclusive is Red light
Actions	Green light = no action; everything is okay Amber light = investigate the slightly larger than expected movement to determine if it is a real world effect or an error with the process somewhere. Red light = stop the process and fix the problem. This includes: investigating where any changes have occured to the system, processes or methodologies from last time; check data inputs; etc. For more information on the contingency strategy please see: s:/section drive/quality gate 5/Actions/QM1
Roles	
Owner Area / Gate Keeper	Victoria in the business area responsible for the process.
Provider Stakeholders	* Andrew in the business area for data item A and its corresponding cross classifications * Kate in the business area for data items B and D and their corresponding cross classifications * Paul in the business area for data item C and its corresponding cross classifications * Emma in the business area as the sign off person
Other Stakeholders	* Tanya in the analysis area who utilises the data from our collection and has a report due out in one month * Kettie from the support area who is extracting data from our file for a data request

Quality Measures Definition Document - Qualitative Quality Measures (e.g. Yes/No)	
Name of Quality Measures	QM2 - Validation of Publication
Description	This quality measure checks that all internal consistency are correct i.e. that the same total in various table within the publication are identical.
Why we need the measure	This quality measure ensures that the publication is correct. It will also highlight if there are any possible errors in the calculation and derivation of any publication tables.
Where	
Quality Gate	Quality Gate 5
Level	* Internal validation of tables - see: s:/section drive/tables/validation/tabledocument (for more detail on the checks undertaken). * Validation of derived items - see: s:/section drive/tables/validation/derivedtemsdocument (for more detail on the checks undertaken). * Written articles in the publication checked for spelling, grammar and numerical correctness.
Tolerance	Tolerance is zero. That is there can be no differences in the numbers provided for the same data item. Green = no difference between the same data items Red = at least one data item does not match itself
Actions	Green light = continue the process Red light = STOP! Investigate the data item(s) with the error. Check any changes; check derived items, etc. Please see the contingency plan strategy for the checks and processes that will be implemented to fix the error. Found at: s:/section drive/tables/validation/quality gate 5/Actions/QM2
Roles	
Owner Area / Gate Keeper	Victoria in the business area responsible for the process.
Provider Stakeholders	* Emma in the business area as the sign off person * Elizabeth from the business area for doing the internal validation of tables and written articles check * Stephen from the business area for doing the compiled items
Other Stakeholders	* Tanya in the analysis area who utilises the data from our collection and has a report due out in one month * Kettie from the support area who is extracting data from our file for a data request

APPENDIX ABS STATISTICAL RISK ASSESSMENT FRAMEWORK

ABS STATISTICAL RISK ASSESSMENT FRAMEWORK

The ABS Statistical Risk Assessment Framework can be used in several ways to assist in the development of quality gates for a statistical process. The Statistical Risk Assessment Framework can be used to assist in assessing the level of risk to the process, statistical outputs, and organisation of a particular situation occurring. It can also assist with the "action" that should be taken if a quality gate is failed.

The Statistical Risk Assessment Framework cross classifies the levels of "Likelihood" (chance of the risk occurring) and "Consequence" (effect on the immediate process or statistical outputs of the risk occurring) to reveal an overall assessment of the risk which could be either Low (L), Moderate (M), High (H) or Extreme (E) to help with decision making.

Likelihood	**Consequences**				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	**M**	**H**	**H**	**E**	**E**
Likely	**M**	**M**	**H**	**E**	**E**
Possible	**L**	**M**	**H**	**E**	**E**
Unlikely	**L**	**L**	**M**	**H**	**E**
Rare	**L**	**L**	**M**	**H**	**H**

RATING RISK LEVEL

Level	*Detail Description*
E	Extreme risk - a quality gate is required.
H	High risk - a quality gate is required.
M	Moderate risk - an additional quality measure(s) to an existing quality gate may be adequate for mitigating the risk of error rather than the creation of a new quality gate.
L	Low risk - generally taken care of by normal routine operations. However, check to make sure that a quality measure for monitoring purposes does exist in a quality gate.

CONSEQUENCES

Descriptor	*Detail Description*
Insignificant	The issues to the process can be dealt with through routine maintenance. There would be no consequences to the overall organisation.
Minor	The issues would threaten the efficiency or effectiveness of some aspects of the process but can be dealt with internally. There would be no consequences to the overall organisation.
Moderate	The issues would not threaten the statistical output, but could cause delays in the process. There may be some timeliness issues which may impact on the reputation of the organisation.
Major	The issues would threaten the survival of the statistical collection or the continuation of the process, or require the intervention of top level management. The risk of the issues seriously threatening the credibility or reputation of the organisation would be high.
Severe	The issues would threaten the survival of not only the process but the organisation. The risk of the issues seriously threatening the credibility or reputation of the organisation would be extremely high.

LIKELIHOOD

Descriptor	*Example Detail Description*
Almost Certain	Expected to occur in most circumstances
Likely	Will probably occur in most circumstances
Possible	Will occur at some time
Unlikely	Could occur at some time
Rarly	May occur only in exceptional circumstances

ABS STATISTICAL RISK ASSESSMENT FRAMEWORK *continued*

The ABS maintains ownership of this Statistical Risk Assessment Framework and reserves the right to update the framework as part of an ongoing commitment to continuous quality improvement.

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