

TECHNICAL CODE

BUSINESS CONTINUITY MANAGEMENT (BCM)

DRAFT FOR PUBLIC COMMENT

Developed by



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Committee representation

This technical code was developed by Trust and Privacy Sub Working Group which supervised by Security, Trust and Privacy Working Group under the Malaysian Technical Standards Forum Bhd (MTSFB) consists of representatives from the following organisations:

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Malaysian Communications and Multimedia Commission

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Foreword

This technical code for Business Continuity Management (BCM) for Communication and Multimedia Industry ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd ('MTSFB') via its Trust and Privacy Sub Security Working Group.

BCM enables an organisation to establish, implement and maintain a policy and framework to minimise the impact of such incidents, and improve organisational resilience. With BCM, the organisation will identify the key risks, impacts and critical business functions - including the essential minimum resources which will enable the organisation to continue, recover, restore and resume critical business functions during a disaster.

This Technical Code will be addressing the following components:

- a) Context of Organisation;
- b) Leadership
- c) Planning
- d) Support
- e) Operation
- f) Performance evaluation
- g) Continual improvement

This Technical Code shall continue to be valid and effective until reviewed or cancelled.

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REQUIREMENTS FOR BUSINESS CONTINUITY MANAGEMENT (BCM)

0. Introduction

Any major incident or disaster occurring could have a significant business impact over time on the organisation.

The Business Continuity Management (BCM) implementation (see Figure 1) is expected to provide the following benefits:

- a) Provide a structured approach of managing risk within the organisation's environment;
- b) Provide strategic plan to respond and recover from risks that cannot be controlled or mitigated;
- c) Provide business continuity and minimise damages and losses under adverse or abnormal conditions;
- d) Reduce negative impact to business objectives;
- e) Encourage improved collaboration between its stakeholders and third parties;
- f) Provides assurance to top management and stakeholders that it can depend upon predetermined levels of services in the event of a disruption;
- g) Enhance the organisation's reputation for prudence and efficiency; and
- h) Potentially gains competitive advantage through the demonstrated ability to deliver business continuity and maintain product and service delivery in the event of disruption.

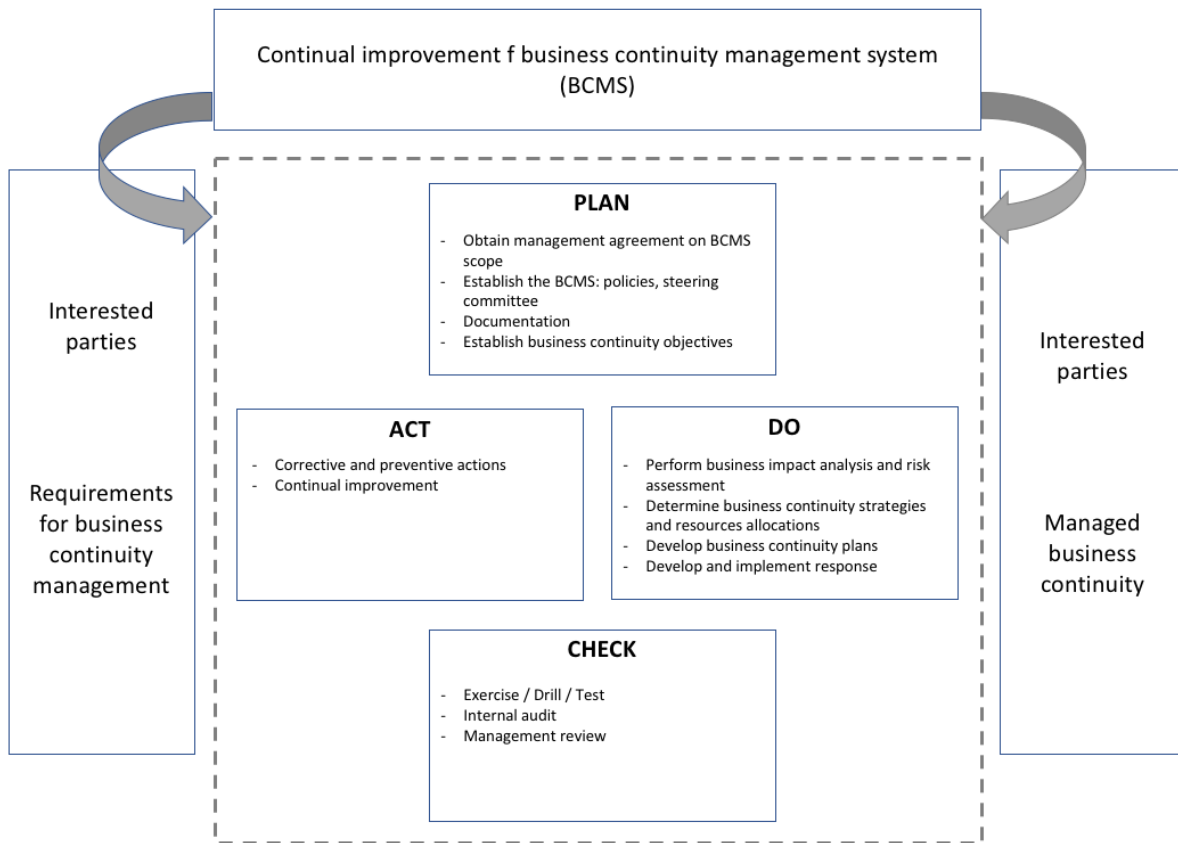


Figure 1. Business continuity management implementation cycle

1. Scope

This Technical Code defines the requirements that support the implementation of the BCM in the context of the communications and multimedia industry (CMI) in Malaysia. The requirement set out in this Technical Code are generic and intended to be applicable to any size of CMI organisations.

2. Normative reference

The following normative references are indispensable for the application of this Technical Code. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

There are no normative references.

3. Terms and definitions

For the purposes of this technical code, the following terms and definitions apply.

3.1 business continuity management

Holistic management process that identifies potential threats to an organisation and the impacts to business operations those threats, if realised, might cause, and which provides a framework for building

organisational resilience with the capability of an effective response that safeguards the interests of its key stakeholders, reputation, brand and value-creating activities.

3.2 business continuity plan

Documented procedures that guide organisations to respond, recover, resume and restore to pre-defined level of operation following disruption.

This covers resources, services and activities required to ensure the continuity of critical business functions.

3.3 business impact analysis

Process of analysing activities and the effect that a business disruption might have upon them.

3.4 business recovery

The courses of action for rebuilding functions to the condition where they are ready to process data or information. This condition should be at a level sufficient to meet minimum business continuity objective.

3.5 critical business functions

Vital functions without which an organization will either not survive or will lose the capability to effectively achieve its critical objectives, such as delivery of key products and services, operational support functions etc.

3.6 crisis management team

A group of individuals responsible for developing and implementing a comprehensive plan for responding to a disruptive incident. The team consists of a core group of decision-makers trained in incident management and prepared to respond to any situation.

3.7 interested party stakeholder

Person or organisation that can affect, be affected by, or perceive themselves to be affected by a decision or activity.

NOTE. This can be an individual or group that has an interest in any decision or activity of an organisation.

3.8 maximum tolerable period of disruption

Time it would take for adverse impacts, which might arise as a result of not providing a critical business functions or performing an activity, to become unacceptable.

NOTE. Some standards or best practice documents shall use Maximum Tolerable Downtime (MTD).

3.9 minimum business continuity objective

Minimum level of services and/or products that is acceptable to the organisation to achieve its business objectives during a disruption.

3.10 recovery point objective

Point to which information used by an activity shall be restored to enable the activity to operate on resumption.

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3.11 recovery strategies

An approach by an organisation that will ensure its recovery and continuity in the face of a disaster or other major outage. Plans and methodologies are determined by the organisation's strategy. There shall be more than one solution to fulfil an organisation's strategy. Examples: Internal or external hot-site, or cold-site, Alternate Work Area reciprocal agreement, Mobile Recovery etc.

3.12 recovery time objective

The duration of time from the activation of the BCP to the point when the specific business function is recovered. It is the acceptable duration of time that can elapse before the non-continuation of the specific business function would result in severe business impact and losses to the organisation.

3.13 risk appetite

Amount and type of risk at an organisation is willing to pursue or retain.

3.14 risk assessment

Process of identifying the risks to an organisation, assessing the critical functions necessary for an organisation to continue its business operations. Risk analysis often involves an evaluation of the probabilities and severities of a particular event.

3.15 third parties

The suppliers, service providers, outsourced vendor and other relevant third parties.

3.16 top management

Person or group of people who directs and controls an organisation at the highest level.

Top management has the power to delegate authority and provide resources within the organisation. If the scope of the BCM covers only part of an organisation then top management refers to those who direct and control that part of organisation.

4. Abbreviations

For the purpose of this Technical Code, the following abbreviations apply:

BCM	Business Continuity Management
BCP	Business Continuity Plan
BIA	Business Impact Analysis
MBCO	Minimum Business Continuity Objective
MTPD	Maximum Tolerable Period of Disruption
RPO	Recovery Point Objective
RTO	Recovery Time Objective

5. Context of organisation

The organisation shall determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s) of its BCM.

NOTE: Determining these issues refers to establishing the external and internal context of the organisation considered in Clause 6.3 of ISO 31000:2009.

5.1 Purpose of BCM

The key purpose of implementing BCM is to protect the following against disasters and major disruptive events:

- a) People - ensure safety and protect health and welfare of employees and interested parties.
- b) Key stakeholders - shareholders, investors, customers, business partners, contractors, suppliers and visitors.
- c) Key information and physical assets.
- d) Critical business functions - business operations and supply chain.

The corporate level minimum business continuity objectives (MBCO) shall be established based on the key purpose. The key purpose of BCM and the corporate MBCOs provides the key criteria with which the BCP will be implemented. Therefore, these shall be clearly communicated to and understood by stakeholders and third parties

5.2 Determining the scope of BCM

The scope shall enable the organisation to achieve the key purpose and the corporate MBCOs. The organisation shall establish BCM capabilities and competencies which will enable it to continue, recover and resume critical business activities to meet these requirements.

When determining the BCM scope the organisation shall:

- a) identify the functional parts to be included in the BCM;
- b) establish the BCM requirements taking into consideration its mission, goals, legal responsibilities and internal and external obligations;
- c) identify the products and services in a manner that enables all related activities, resources and supply chains to be identified;
- d) take into account the needs and interests of interested parties; and
- e) identify the applicable legal and regulatory requirement related to the continuity of its operation, product and services.

The BCM scope shall established for a limited scope covering important business and support operations at specific sites. The business continuity (BC) should be flexible, adaptable and scalable to increase the BCM capabilities and competency over time.

BCM scope shall also:

- a) include an indication of the incident scale that the BCM will address and the organisation's risk appetite; and

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- b) identify how the BCM fits into the organisation's overall risk management strategy.

Where part of an organisation is excluded from the scope of its BCM, the organisation shall document the exclusion as determined by business impact analysis and applicable legal or regulatory requirements.

6. Leadership

Leadership is essential to ensure the BCM is relevant and applicable to the organisation. Strategic decisions and directions will guide the team to develop and implement a BCM that meets the key purpose and the corporate MBCOs. Good leadership will provide assurance that essential resources and budget to support the agreed recovery strategies.

6.1 Leadership and commitment

Top management is responsible to ensure the development, implementation, maintenance and effectiveness of the BCM in the organisation.

A Business Continuity Manager, with the appropriate level of responsibilities and authorities, shall be appointed to lead the team implementing or maintaining the BCM and provide guidance.

6.2 Management commitment

Top management shall demonstrate its commitment to the BCM.

Top management shall provide evidence of its commitment to the development and implementation of the BCM and continually improving its effectiveness by:

- a) complying with applicable legal and other requirements to which the organisation subscribes;
- b) integrating BCM processes into the organisation's established maintenance and review procedures;
- c) establishing BC policy and objectives in line with the organisation's objectives, obligations and strategic direction.
- d) appointing one or more persons with the appropriate authority and competencies to be responsible for the BCM and accountable for its effective operation;
- e) ensuring that BCM roles, responsibilities and competencies are established;
- f) ensuring the availability of sufficient resources, including monetary support;
- g) communicating to the organisation the importance of fulfilling BC policy and objectives;
- h) ensuring that internal BCM audits are conducted;
- i) ensuring regular management reviews of the BCM;
- j) directing and supporting the improvement of the BCM.
- k) operational involvement through steering groups; and
- l) inclusion of BC as an item at management meetings.

6.3 Policy

Top management is responsible for steering BCM with policies and strategies necessary for the continuation of critical business functions by providing a framework for setting BC objectives. In addition, the BC policy shall demonstrate sufficient awareness of the risks, mitigating measures and state of readiness by way of confirmation to the organisation.

The top management shall establish a BC policy that:

- a) is appropriate to the purpose of the organisation;
- b) provides a framework for setting BC objectives;
- c) includes a commitment to satisfy applicable requirements; and
- d) includes a commitment to continual improvement of BCM.

The BCM policy shall be available in documented information, and being communicated within the organisation as well as available to the interested parties, as appropriate.

6.4 Responsibilities

The organisation shall also establish a dedicated BCM Steering Committee which consist of relevant top management. The BCM working committee that is led by Business Continuity Manager, who is responsible to support and provide feedback to BCM Steering Committee.

The working committee shall comprise a BCM coordinator, who is assigned to monitor the BC and representatives which include, but not limited to:

- a) Critical business units;
- b) IT;
- c) Internal audit;
- d) Legal and regulatory;
- e) Human resource;
- f) Security;
- g) Property management and services;
- h) Corporate and services/communication; and
- i) Customer service.

The organisation shall retain a documented information that define the roles and responsibilities of individuals and/or committee responsible for BCM.

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7. Planning

7.1 Addressing risks

When planning for the BCM, the organisation shall consider the issues referred to the context of organisation and determine the risks that need to be addressed to

- a) ensure the management system can achieve its intended outcome(s);
- b) prevent, or reduce, undesired effects; and
- c) achieve continual improvement.

The organisation shall plan:

- a) action to address these risks; and
- b) how to:
 - i) integrate and implement the actions into its BCM processes; and
 - ii) evaluate the effectiveness of these actions.

7.2 Business continuity objectives and plans to achieve them

Top management shall ensure that business continuity objectives are established and communicated for relevant and levels within the organisation.

The business continuity objectives shall:

- a) be consistent with the business continuity policy;
- b) the organisation's business functions that requires contingency measures;
- c) take account of the minimum acceptable level to organisation objectives;
- d) be measurable;
- e) take into account applicable requirements; and
- f) be monitored and updated as appropriate.

To achieve its business continuity objectives, the organisation shall determine:

- a) role and responsible;
- b) what will be done;
- c) resources required;
- d) when it will be completed; and
- e) how the results will be measured and evaluated.

The organisation shall retain documented information on the business continuity objectives.

8. Support

The organisation shall determine and provide the resources needed for the BCM that will:

- a) achieve its business continuity policy and objectives;
- b) meet the changing requirements of the organisation;
- c) enable effective communication on business continuity management matters, internally and externally; and
- d) provide for the on-going operation and continual improvement of the business continuity management.

These shall be provided in a timely and efficient manner.

8.1 BCM resources

When identifying the resources required for the BCM, the organisation should make adequate provision for:

- a) people and people-related resources, including:
 - i) the time necessary to fulfil BCM roles and responsibilities;
 - ii) training, education, awareness and exercising; and
 - iii) management of BCM personnel;
- b) facilities, including appropriate work locations and infrastructure;
- c) information and communications technology (ICT), including applications and security controls that support effective and efficient programme management;
- d) management and control of all forms of documented information;
- e) communication with interested parties; and
- f) finance and funding.

Resources and their allocation shall be reviewed periodically in order to ensure their adequacy.

8.2 Incident response personnel

The organisation shall nominate incident response personnel with the necessary responsibility, authority and competence to manage an incident.

The incident response personnel shall form a group that is responsible for managing any disruptive incident that significantly impacts or has the potential to significantly impact the organisation.

Personnel shall be assigned to teams according to their demonstrated competence of dealing with different aspects of incident response, for example:

- a) Incident management / strategic management;
- b) Communications;

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- c) Safety and welfare;
- d) Salvage and security;
- e) Resuming activities; and
- f) Recovery of ICT.

All personnel who are in these groups shall have clearly defined responsibilities and authorities that apply before, during and after an incident.

8.3 Competence

The organisation shall establish an appropriate and effective system for managing competence of persons undertaking BCM work under its control.

Management shall determine the competencies required for all BCM roles and responsibilities and the awareness, knowledge, understanding, skills and experience needed to fulfil them. All assigned personnel with BCM roles within the organisation shall demonstrate the competencies required and be provided with training, education, development and other support needed to do so.

The organisation shall identify and deliver the business continuity functional training requirements of relevant participants and evaluating the effectiveness of its delivery.

Response skills and competence throughout the organisation shall be developed by practical training, including active participation in exercises.

The organisation shall establish training and awareness programmes for employees that shall be affected by a disruptive incident.

8.4 Awareness

Persons doing work under the business continuity management shall be aware of:

- a) the business continuity policy;
- b) their contribution to the effectiveness of the BCM, including the benefits of improved business continuity management performance;
- c) the implications of not conforming with the BCM requirements; and
- d) their own role and responsibility during disruptive incidents.

Management shall progressively promote an organisational culture that places high priority on enhancing business continuity capability and ensures BCM becomes an integral part of strategic management process and routine business operations. Awareness and periodic briefings for the Top Management is equally important to ensure continuing commitment and support for the BCM.

8.5 Communication

The organisation shall establish a communication plan that include:

- a) Internal communications within employees and interested parties within the organisation;
- b) External communications within stakeholders, partners, customers, local community as well as media;

- c) Ensuring the availability of the means of communication during disruptive incident; and
- d) Operating and testing of communications capabilities intended for use during disruption of normal communication.

The organisation shall maintain an emergency contact list of all relevant parties and key recovery personnel essential for the swift response and recovery of critical business functions. The contact list shall be regularly updated.

8.6 Document control and change management

The organisation shall ensure that access to the documents and information related to BCM are granted based on as needed basis and only to its authorised personnel.

Changes of BCM documentation, amendment to the BCP shall be undergone with a formal change management process to ensure the changes are approved by appropriate and authorised management level.

9. Operations

9.1 Operational planning and control

The organisation shall determine, plan, implement and control those actions needed to fulfil its BC policy and objectives and meet applicable needs and requirements.

These actions shall be combined to create a programme to ensure that the organisation's business continuity is managed appropriately and its effectiveness maintained.

The organisation shall establish control mechanisms within the programme that include:

- a) deciding how these actions shall be determined, planned, implemented and controlled, for example by establishing an implementation plan and agreeing a suitable methodology for implementing BCM;
- b) ensuring that controls over these actions are implemented in accordance with the decisions made by, for example, setting project milestones and specifying required deliverables; and
- c) keeping documented information to demonstrate that the processes have been carried out as planned.

The organisation shall ensure that planned changes are controlled, unintended changes are reviewed, and appropriate action is taken.

Figure 2 illustrates the elements of operational planning and control.

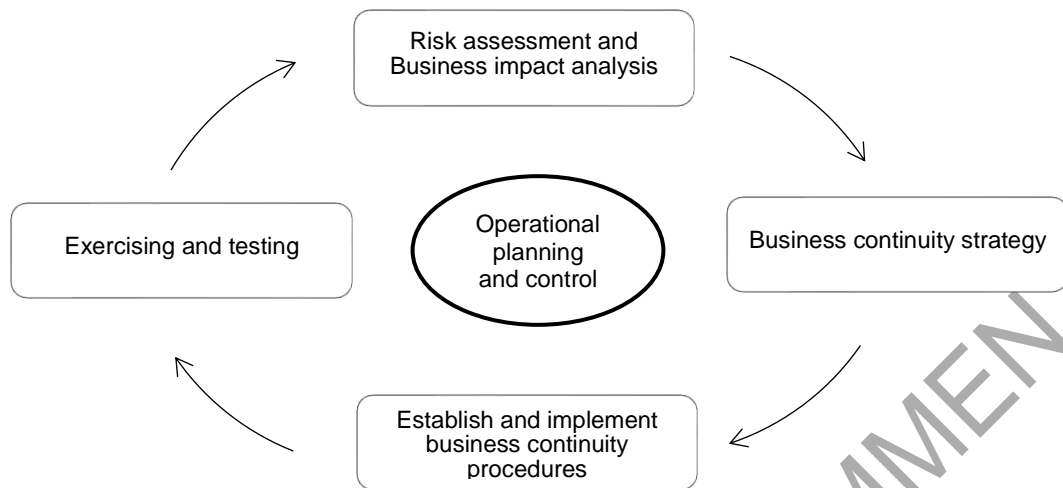


Figure 2. Elements of operational planning and control

9.2 Risk assessment and business impact analysis

9.2.1 Risk assessment

Organisation shall ensure that each business area determine its critical resources and processes. The organisation shall identify and assess potential threats that could severely interrupt operations and business activities through structured risk assessment (RA) process. For business-critical processes, the impact of a complete or partial failure of the corresponding resources is measured by means of an impact analysis.

Risk assessment shall be carried out at least annually or more frequently if there are significant changes to the internal operations or external environments.

The organisation shall measure the likelihood of the identified threats occurring and determine the impact on the organisation. The organisation is expected to carry out a BIA annually which forms the foundation of developing the BCP and whenever there are material changes to the organisation's business activities.

9.2.2 Business impact analysis

The organisation shall establish, implement, and maintain a formal and documented BIA that evaluates and determines continuity and recovery priorities, objectives and targets.

The BIA exercise shall be conducted for all business functions within the scope (Clause 5.2) in a structured and systematic manner, so as to identify critical business functions, resources and infrastructure of the organisation.

This assessment shall consider mutual interdependencies between business areas (up/downstream processes) and dependencies in connection with third parties.

The analysis is intended to indicate:

- a) the desired extent to which business-critical processes are to be recovered;
- b) the maximum period until the recovery of business-critical processes;

- c) the impacts that a disruption of these activities would have on the organisation;
- d) the minimum scope of resources or replacement (buildings, staff, IT/data, security, external providers) that shall be available in the event of a crisis in order to achieve the desired level of recovery; and
- e) Interdependencies and dependencies between business areas and/or third party.

9.2.2.1 MTPD and RTO

Based on the business impact analysis (BIA) results, the organisation shall determine the MTPD and recovery time objective (RTO) for each critical business function. The goal is to develop a BCP that details the procedures and the minimum level of resources required to recover the critical business functions within the recovery timeframe and maintain services at an acceptable level.

The MTPD and RTO shall correspond with the importance and criticality of the business functions. The organisation shall establish shorter RTO for business functions that have significant impact and shall not exceed MTPD. All MTPDs and RTOs of critical business functions shall be validated and approved by top management.

The organisation shall consider incorporating specific RTO requirements in contractual arrangements with third parties.

9.2.2.2 Recovery point objective (RPO)

The organisation shall determine the RPO for each critical business function in order to develop the backup strategy that enable the business function activity to operate on recovery.

The RPO shall be validated and approved by top management.

Figure 3 illustrates the relationship within RPO, RTO, MBCO and MTPD.

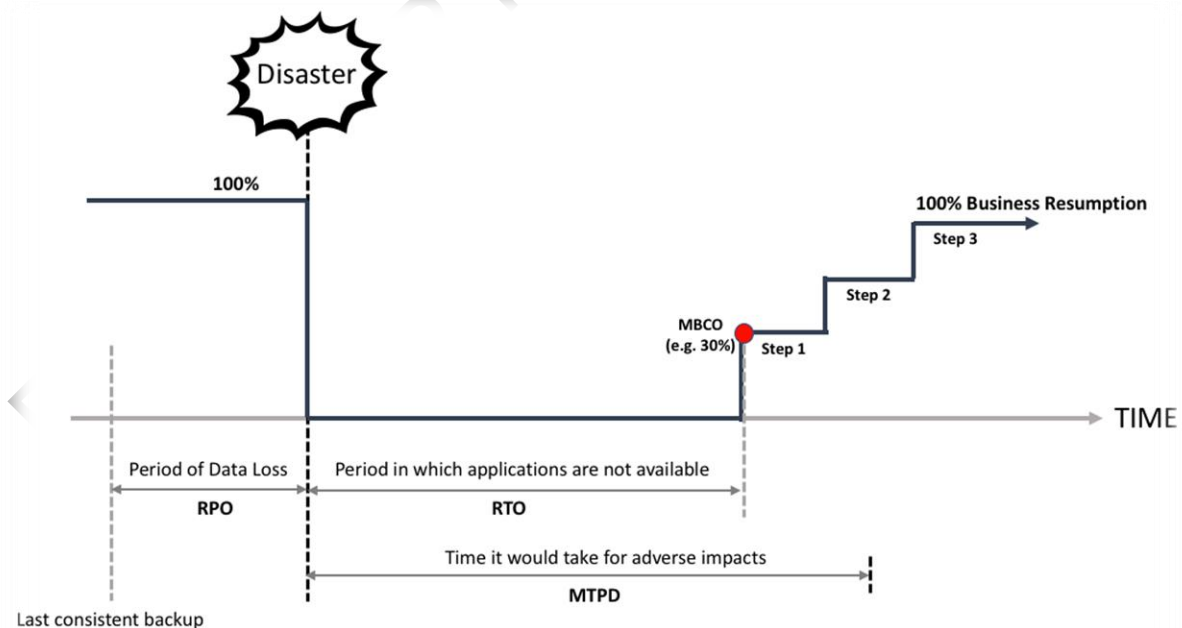


Figure 3. RPO, RTO, MBCO and MTPD Concept

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Table A1 in Annex A shall be used as a sample of qualitative measurement in prioritising the organisation's key functions and services.

9.3 Business continuity strategies

The organisation shall formulate and document appropriate BC strategy for all critical business functions to ensure the continuity or recovery of essential services within the acceptable timeframe.

BC strategy lays down the fundamental procedure with which the company intends to achieve the recovery objectives for the underlying scenarios and their impact on resources identified in the BIA and Risk Assessment.

The organisation shall also consider proactive and reactive measures that:

- a) Reduce the likelihood of disruption;
- b) Shorten the period of disruption; or
- c) Limit the impact of disruption on the organisation's critical business functions.

The recovery strategies are part of business continuity strategies that shall indicate the following:

- a) The recovery timeframe;
- b) Delivery of the minimum level of essential services;
- c) Functional relocation;
- d) The alternate and recovery sites; and
- e) Resources such as key personnel including the decision makers, work area, data, facility and technology requirements, where appropriate.

The continuity strategies shall be:

- a) documented and approved by management or relevant committees to ensure alignment with corporate goals and business objectives; and
- b) regularly reviewed to ensure relevancy as business activities and operating environment change.

9.4 Establish and implement BC procedures

The organisation shall put in place documented procedures that provide overall control of the response to a disruptive incident and resume activities within their RTO. The BC procedures shall establish the appropriate internal and external communications protocol and be:

- a) specific - immediate steps that should be taken during a disruption;
- b) flexible - shall be used to respond to unanticipated threat scenarios and changing internal and external conditions;
- c) focused - clearly relate to the impact of events that could potentially disrupt operations and be developed based on stated assumptions and analysis of interdependencies; and
- d) effective - minimising the consequences of incidents through implementation of appropriate mitigation strategies.

9.4.1 Business continuity plans

The organisation shall develop a workable BCP for all critical business functions.

Management shall be involved in BC planning. The responsibility of management in ensuring that a well-designed plan is developed does not diminish although the BCP formulation is undertaken by a consultant.

The BCP shall include, at least:

- a) Procedures to be followed in response to a major disruption to business operations. The procedures shall enable the organisation to respond swiftly to a crisis situation, recover and resume the critical business functions, resources and infrastructure outlined in the BCP within the stipulated timeframe.
- b) Escalation, declaration and notification procedures. The organisations shall maintain a call tree and contact list.
- c) The conditions for BCP activation and the individual with authority to declare a disaster and grant permission to execute the recovery processes.
- d) A list of all resources required to recover critical business functions in the face of a major disruption. This shall include but not limited to, key recovery personnel, computer hardware and software, office equipment, facilities and relevant documentation.
- e) Relevant information about the alternate and recovery sites.
- f) Procedures for restoring normal business operations. This shall include the orderly entry of all business transactions and records into the relevant IT systems and the completion of all verification and reconciliation procedures.

The organisation shall ensure that their BCPs have adequate arrangements and resources to deal with a possible emergence of a pandemic or infectious disease. The organisation is encouraged to align their preparatory and response measures to the outbreak stages used by the relevant government authority.

The organisation shall ensure that recovery personnel's responsibilities are clearly documented in the BCP. During a major disruption, staff could be unavailable for various reasons, hence alternate recovery personnel be identified for all critical business functions.

9.4.2 Alternate and recovery sites

The organisation shall make available a functional alternate and recovery site in the event the business premises, key infrastructure and systems supporting critical business functions become unavailable.

The alternate and recovery sites shall either be in-house arrangements, or available through agreement with third-party recovery facility provider, or a combination of both options.

The organisation shall assess the suitability and capacity of the alternate and/or recovery site to ensure that the site is:

- a) Sufficiently distanced from the primary site to avoid being affected by the same disaster or source of disruption;
- b) Using a separate or alternative telecommunication network and power grid from the primary site to avoid single point of failure; and

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- c) Readily accessible and available for occupancy, taking into consideration the logistic requirements within the recovery timeframe stipulated in the BCP.
- d) For technology requirements, the organisation shall ensure that the IT systems at the recovery sites are:
 - i) Compatible with the organisation's primary systems (in terms of capacity and capability as agreed to MBCO) to adequately support the critical business functions; and
 - ii) Continuously updated with current version of systems and application software to reflect any changes to the organisation's system configurations (e.g. hardware or software upgrades or modifications).

The organisation shall provide a recovery facility (hot-site, online mirroring, etc), which commensurate with its established MTPD / RTO and for critical business functions.

For the use of a third-party alternate site or recovery facility, the organisation shall:

- a) Establish a written contract to safeguard the organisation's interest;
- b) Provide a service level agreement (SLA) between the organisation and the third party to determine the level and type of services to be provided to the organisation. The SLA shall be properly documented and approved by the management;
- c) Assess the capacity and capability of the third-party sites for a reasonable prolonged period; and
- d) Ensure that adequate physical and logical access control is provided by the third party to safeguard the recovery facility.

The organisation shall ensure that a periodic and continuous review and monitoring be undertaken on the service level provided by the third party and the measures mentioned in items b), c) and d) above.

The organisation shall ensure that the back-up strategy is consistent with the agreed RPO of respective business functions.

9.4.3 Critical business information records

The organisation shall ensure that sufficient number of backup copies of critical business information, software and related hardcopy documentation (for systems and users) are available for the recovery of critical business functions. A copy of the information, documentation and software shall be made available at an off-site premise or backup site, and any changes or updates shall be done periodically and reflected in all copies.

A full systems backup shall be periodically conducted and shall at least consist of the updated version of the operating system software, production programs, system utilities and all master and transaction files. The frequency of backup would depend on its criticality and shall be performed after critical modification or updates.

All backup media shall be:

- a) properly labelled using standard naming conventions that at least indicate usage, date and retention schedules.
- b) regularly tested to ensure that it can be restored when necessary
- c) rotated in a systematic and timely cycle;

- d) stored off-site in a secure and access-controlled environment, which is of consistent standard to the main site and in accordance with manufacturer's recommendations. The backup site shall also be located at a distance that would protect it from damage resulting from any incident at the primary site, but facilitates quick retrieval process. Transportation to the backup site shall be done in a controlled and secured manner with proper authorisation and record.
- e) disposed using established procedures.

9.5 Exercising and testing

The organisation shall exercise and test with BC procedures to ensure consistency with the organisation BC objective.

Regular: Organisations are encouraged to carry out different types of tests. Taking into consideration the criticality of the business functions, the complexities, resources required and the testing objectives, organisations shall conduct tests in modules and at different but regular intervals. Management and staff shall participate in these exercises and be familiar with their roles and responsibilities in the event of activation.

Complete and meaningful: All components of a business process should be meaningfully tested (e.g. from front-line through to supporting and processing components, etc.). This shall include testing the connectivity, functionality and load capacity of the infrastructure provided at the recovery site(s). Organisations should satisfy themselves that their exercise programmes adequately cover both the qualitative (e.g. response time, etc.) and quantitative (e.g. volume capacity, etc.) aspects.

They shall critically challenge all strategic and planning assumptions regularly to ascertain their applicability, especially when business scope or direction changes. Completeness would also include the awareness and preparedness of staff and coordination with external parties, as well as thorough testing of all interdependencies.

Organisations shall progressively make their exercises more challenging and introduce different scenarios each time they conduct the same type of exercise. This would lead to an increase in confidence of their business continuity preparedness.

Exercises shall include:

- a) Desk-top walk-through exercise to full system test;
- b) Staff call-tree activation (with and without mobilisation);
- c) Back-up site to back-up site exercise (including with IT or disaster recovery service providers);
- d) Alternative arrangements of shared services;
- e) Back-up disk restoration; or
- f) Retrieval of vital records.

Formal exercise documentation and debrief, post mortem reviews listing lessons learnt and any new risk mitigating measures shall be prepared. Management representative or management shall sign-off on the documentation and concur with the proposed new mitigating measures.

Minimum BCP testing requirements shall include, but not limited to:

- a) Verifying completeness of the plan and adequacy of recovery procedures;

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- b) Assessing familiarity of staff with their BC responsibilities and the organisation's evacuation procedures;
- c) Evaluating connectivity, functionality, performance and load capacity of alternate and recovery sites;
- d) Assessing adequacy of security implementation and staff awareness;
- e) Assessing effectiveness of communication plan and coordination with relevant parties;
- f) Evaluating response time; and
- g) Recommending remedial actions for future tests.

BCP test results for critical business function and application shall be timely communicated to the top management.

10. Performance Evaluation

10.1 Monitoring, measurement, analysis and evaluation

The procedures for the performance and the effectiveness of the BCM shall include the following:

- a) setting of performance metrics;
- b) assessment of the protection of prioritised activities;
- c) confirmation of compliance with requirements;
- d) examination of historical evidence; and use of documented information to facilitate subsequent corrective actions.

The procedures for monitoring performance shall include the following:

- a) setting of performance metrics including qualitative and quantitative measurements that are appropriate to the needs of the organisation;
- b) monitoring the extent to which the organisation's BC policy and objectives are met;
- c) identifying when the monitoring and measuring should take place;
- d) assessing the performance of the processes, procedures and functions that protect prioritised activities;
- e) proactive measures of performance that monitor compliance of the BCM with applicable legislation, statutory and regulatory requirements; and
- f) recording data and results of monitoring and measurement sufficient to facilitate subsequent corrective action analysis.

Procedures shall also reference BC policy and objectives.

The organisation shall be able to demonstrate that it has identified, evaluated and complied with the legal requirements and any other subscribed requirements.

Records of all periodic evaluations and their results shall be maintained. The organisation shall analyse, and at planned intervals, evaluate the outcomes from the monitoring and measurement.

10.2 Evaluation of business continuity procedures

The organisation shall conduct evaluations of its BC procedures in order to ensure their continuing suitability, adequacy and effectiveness.

The evaluations shall address the possible need for changes to policy, objectives, strategies, and other elements of the BCM considering the exercise results, post-incident reviews, changing circumstances and the commitment to continual improvement.

The evaluations shall take the form of internal or external audits. The frequency and timing of reviews shall be influenced by laws and regulations, depending on the size, nature and legal status of the organisation. They might also be influenced by the requirements of interested parties.

A clearly defined and documented maintenance programme shall be established.

The outcomes from the maintenance process shall include:

- a) documented evidence of the proactive management and governance of the organisation's BCM;
- b) verification that key people that will implement the BC strategy and procedures are trained and competent;
- c) verification of the operational planning and control of BCM (Refer clause 10.1);
- d) evidence that the organisation has evaluated compliance of its BC procedures; and
- e) evidence that significant changes to the organisation's structure, products and services, and activities have been reflected in the organisation's BC procedures in a timely manner.

10.3 Internal audit

Internal auditors shall periodically verify that effective BCM practices are implemented in the organisation, in line with the principles and requirements stipulated in this Technical Code and the organisation's BCM policies and procedures.

Internal auditors shall review the level of commitment to BCM and overall preparedness against the organisation's BCM policies and regulatory requirements. For outsourced services, the auditors or other independent party shall periodically review the BCP testing undertaken by the outsourcing vendor to ensure their business continuity preparedness. Gaps identified shall be documented in the audit report together with action plans for further improvement by the respective business functions or outsourcing vendor. The audit report shall be submitted to the relevant management.

10.4 Management review

Top management shall review the organisation's BCM, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

Management review shall include appraisal of:

- a) the status of actions from previous reviews;
- b) the performance of the BCM including trends apparent from nonconformities and corrective actions, the results of monitoring and measurement, and audit findings;

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- c) changes to the organisation and its context that might impact the organisation's BCM; and
- d) opportunities for continual improvement.

Personnel who are involved in implementing the BCM and allocating its resources shall be involved in the management review.

The output of the management review shall include the result in improvements to the efficiency and performance of the BCM and shall result in the following changes:

- a) variations to the scope;
- b) improvements in its effectiveness;
- c) updates to BC procedures; and
- d) changes to controls and how their effectiveness is measured.

The organisation shall retain documented information as evidence of the results of management reviews and shall:

- a) communicate the results of management review to relevant interested parties; and
- b) take appropriate action relating to those results.

11. Improvement

11.1 Nonconformity and corrective action

The organisation shall do the following to address the non-conformity and in making a corrective action:

- a) identify nonconformities, take action to control, contain and correct them, deal with their consequences and evaluate the need for action to eliminate their causes;
- b) establish effective procedures to ensure that non-fulfilment of a requirement. The procedure shall cover the following:
 - i) enable on-going detection, analysis and elimination of actual and potential causes of non-conformities; and
 - ii) define responsibilities, authority and steps to be taken in planning and carrying out corrective action;
- c) planning approach and weaknesses associated with the BCM are identified and communicated in a timely manner to prevent further occurrence of the situation;
- d) identify and address root causes; and
- e) management shall ensure that corrective actions are implemented and that there is systematic follow-up to evaluate their effectiveness.

11.2 Continual improvement

The organisation shall continually improve the effectiveness of the BCM. Continual improvement requires a process that properly identifies problems and non-conformances and then fixes them.

The continual improvement process shall follow the same basic process as used for corrective actions and include the following:

- a) identify the non-conformance;
- b) identify the root cause; and
- c) determine the corrective action.

Corrective actions address deficiencies in the BCM and ensure that it functions as intended, while continual improvement takes the BCM to a higher level of efficiency and effectiveness.

To make the organisation's BCM most effective, the organisation shall monitor and review the organisation's BCM activities. The entire BCM activities, before, during and after an incident, should be reviewed.

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Annex A
(Informative)

Table A1. Prioritisation of the organisation's key functions and services

Impact Ratings	Impact Category	Consequences Description
1 (Minor)	Operation	Little or no disruption to service.
	Reputation	Little or no damage to reputation.
	Financial	Loss of up to 5% of revenues*.
	Business	Minimum or negligible effect on achieving organisations objectives.
	People	Non-reportable minor injuries; simple first-aid
2 (Moderate)	Operation	Slight disruption to service.
	Reputation	Coverage in local media and/or some damage to reputation.
	Financial	Loss of 5% to 30% of revenues.
	Business	Partial failure to achieve organisations objectives.
	People	Reportable injury requiring medical treatment.
3 (Major)	Operation	Loss of service for more than 48 hrs.
	Reputation	Extensive media coverage and/or damage to reputation.
	Financial	Loss of over 30% of revenues.
	Business	Non-delivery of organisations objectives.
	People	Temporary disability; hospitalisation; fatality.

Annex B
(Informative)

Recommended best practices

B.1 Participation in National Cyber drills

As part of the testing.

B.2 Cyber-insurance

As part of risk mitigation:

- a) NADMA;
- b) NC.

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