

# Draft

December 2020



# Coordination Anomaly Management



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## Message from the chairman

It is vividly evident that the world witnessed the worst public health and economic crisis due to COVID-19 pandemic. This inevitably mobilized the international community to act seriously and swiftly. However, the mortalities and morbidities induced by healthcare-acquired infections (HAI) are equally fatal, but the international community did not act similarly. Consequently, we are continuously and chronically suffering from HAI.

The current intervention for HAI is merely based on passively-set standards and enforcing these standards via regulatory agencies such as the centre for disease control and prevention (CDC), joint commission international (JCI), ministries of health, and other regulatory agencies. To efficiently address HAI, we inevitably need to mobilize the international community because HAI traverses a multitude of epistemological dimensions, requiring multidisciplinary tacit knowledge, and mandates active international collaboration. Besides, we believe that we can efficiently traverse deeply into the root-causes and solution landscapes by automating the entire healthcare environmental services and infection control within healthcare institutions using the latest advancements in computational epistemology, computational infection control models, computational epidemiological models, artificial intelligence, machine learning, distributed ledger technology, collective intelligence, cognitive technologies, internet of things, ubiquitous technologies, intelligent micro-measurement frameworks, artificial life, evidence-based program implementation, patient-centric care, strategy anchored execution, and symbiotic healthcare ecosystem services. Consequently, we developed these open standards that were tailored from diverse international standards to promote the automation of healthcare environmental services and infection control processes and best practices.

The Healthcare Environmental Services Operational Map (HESOM) and other standards were developed to efficiently leverage multidisciplinary experts and practitioners to contribute towards the eradication of HAI-induced mortalities and morbidities. Using ReXcels research and innovation environment, we cultivate collective intelligence by bringing together these multidisciplinary experts to iteratively develop these standards and adaptively support the innovation of computational technology that automates the execution and enforcement of these standards. As such, we cordially invite you to use these documents and participate actively in the further development of these standards to significantly reduce HAI-induced mortalities, morbidities, and their enormous negative economic externalities.

**Hamid Adem**

Interim Chairman, and Chief R&D Officer

# Change Control

## Change Control

Version:	Date:	Changes:

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# Coordination Anomaly Management

## Purpose





# 1 Purpose

## 1. PURPOSE

The purpose of this document is to establish Coordination Anomaly Management process that would:

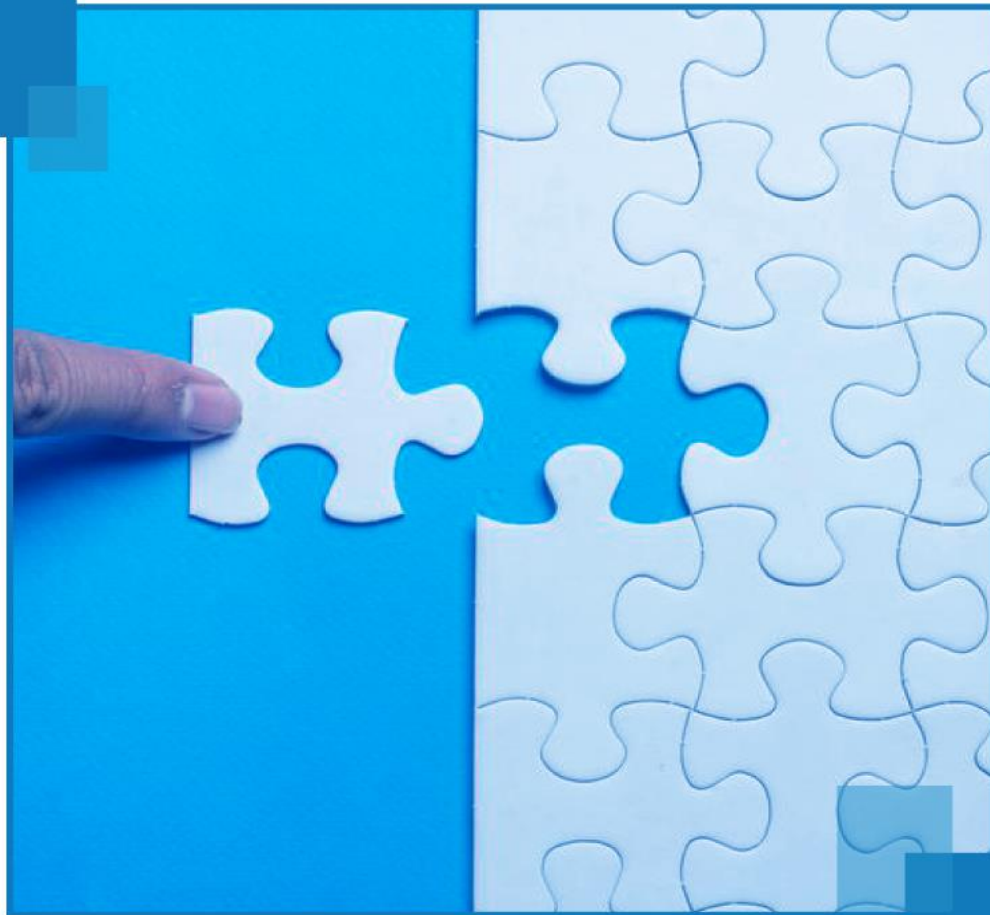
- Efficiently detect coordination outlier patterns and anomalies
- Investigate and remove the root cause of anomalies
- Mitigate and control the negative impact cause

This process is based on international well acclaimed standards like:

- *NHS- National Health Services Standard*
- *OSHA- Occupational Safety and Health Administration standard*
- *CDC- Centers for Disease Control and Prevention standard*
- *Lean six sigma- Quality Standard*
- *JCI- Journal of Clinical Investigation standard*
- *JCAHO- Joint Commission on Accreditation of Healthcare Organizations (JCAHO)*
- *EPA- US Environmental Protection Agency*
- *HCAHPS - Hospital Consumer Assessment of Healthcare Providers and Systems*
- *HIPA- Health Information Privacy Act standard.*

*P.S: This process is a derivation from **ESM (Environmental Service Map)**, which is a holistic and a comprehensive model for Environmental Services Management.*

## Structure of the Document



## 2. STRUCTURE OF THE DOCUMENT

The Coordination Anomaly Management process document comprises the following chapters:

**Chapter–3:** Scope: This chapter describes the scope of the document and the Coordination Anomaly Management process.

**Chapter–4:** General Assumptions: This chapter describes the underlined assumptions made for both the document and Coordination Anomaly Management process.

**Chapter–5:** Coordination Anomaly Management Framework: This chapter exhibits the interaction of Coordination Anomaly Management process with other related processes and also describes the high level process sequence for Coordination Anomaly Management based on EMS framework.

**Chapter–6:** Coordination Anomaly Management Process: In this chapter Coordination Anomaly Management process and sub processes (if any) will be depicted and specified using rigorous BPMN and process specification templates.

**Chapter–7:** References: This chapter serves as a prime reference to Coordination Anomaly Management process and presents the details supporting it in tabular formats. The chapter describes relevant Business Rules, Risks, Quality Attributes, Data Quality Dimensions, Operation Policies, KPIs, CTQs, Abstract Time-scales and SLAs terms specific to Coordination Anomaly Management process.

The Coordination Anomaly Management process is supposed to be a living document and consists of various variable values which would frequently evolve or change as Coordination Anomaly Management process matures or changes.

## Scope



# 3 Scope

## 3. SCOPE

The scope of this process is applicable to all the coordination processes for environmental services department.

## General Assumptions



## 4. GENERAL ASSUMPTIONS

The following are the general assumptions made:

- Inputs to the process are accurate.
- This process is supported by automated tools that would enable detailed analysis and management capabilities for this process.
- The roles defined in this document can be attached to the existing position
- Any process or sub process related assumptions are explicitly identified in related Process Specification table in chapter 6.

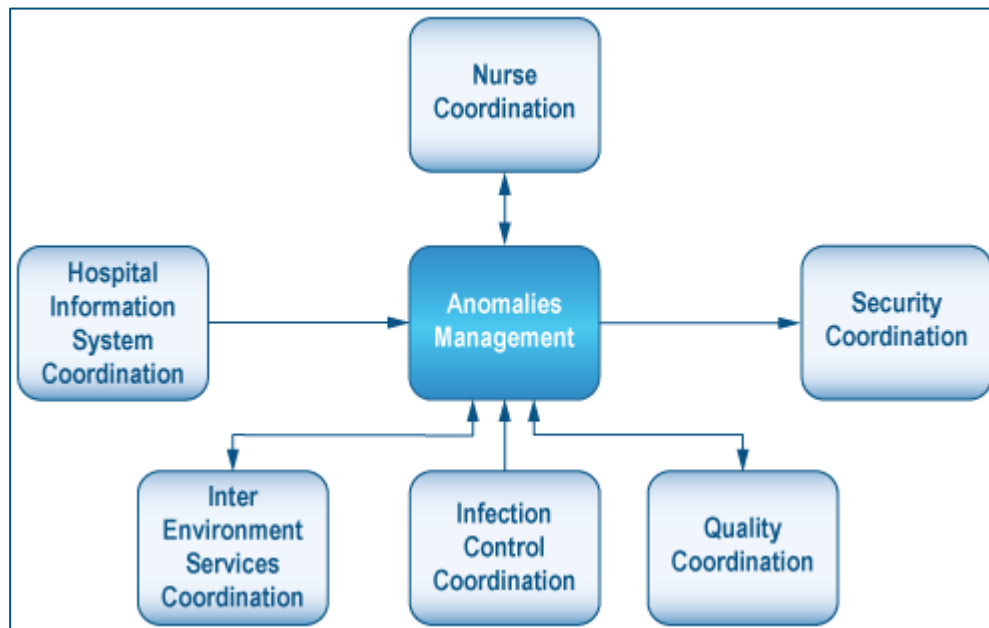
## Coordination Anomaly Management Framework





## 5.1 Coordination Anomaly Management Interactions

The following depiction shows the points of interaction Coordination Anomaly Management process with other related EMS processes. The arrows moving into Coordination Anomaly Management process signify the inputs from the other process to Coordination Anomaly Management process, and the arrows moving out of the Coordination Anomaly Management process signify the inputs from Coordination Anomaly Management process to other related EMS processes. All these processes depicted below are defined in their own respective dedicated documents.



## 5.2 Coordination Anomaly Management Process Sequence

The Coordination Anomaly Management process comprises of following high level sequence of activities:

- Ensure waste control
- Reduce variation
- Establish continuous improvement practice
- Identification of Anomaly

- Anomaly Report
- Anomaly categorization and prioritization
- Anomaly Diagnosis
- Implement Corrective Action Plan
- Close Anomaly report.
- Reporting

**Section 5.2.1 -5.2.6** describes the high level process sequence for Environmental services department Coordination Anomaly Management based on EMS framework. **Section 6.1** Process Model sheds more light on the flow of Coordination Anomaly Management process.

## 5.2.1 Ensure processes waste control

This step involves minimization and control of wastes with regards to coordination anomaly management. Wastes can lead to variation which can lead to quality degradation and variation. Following are the various wastes that this quality process would effectively control.

- **Minimizing Inventory Wastes.** Unneeded stocks and supplies lead to most costs in terms of space occupation and supplies expiration concerns. The best method to deal with this is to enforce **JIT inventory (Just in time inventory)**. Just-in-Time inventory system focus is having the right material, at the right time, at the right place, and in the exact amount.
- **Minimizing Motion Wastes.** This refers to reducing unorganized movement (spaghetti motion) of materials and staff, which can lead to budget over runs.
- **Minimizing Over production.** This refers to reduction of unnecessarily over working or over doing of things which results into over budgeting.
- **Minimizing Over processing.** This refers to the removing the tendency of over complicating things that what is required e.g., using too many resources to solve the anomalies.
- **Minimizing Transportation.** Unnecessary movement of equipment (round traffic) would result into fatigue for the employees and also waste their precious time which can be utilized for some other productive work.
- **Minimizing Rework/ Correction.** This refers to doing the correct thing at the first time. Reworks in terms of Paperwork, management errors would result into reworking time which would affect the overall variation (sigma) and deter the infection control process quality.
- **Minimizing Idle time.** This refers to the time spend in waiting for critical input or resource for the process, without which the process can't proceed. For example, time spend in waiting for resolution results would result into idle time.

## 5.2.2 Reduce variation

Variation can affect almost every key performance measure and key dimensions of such as efficiency, effectiveness, safety, satisfaction, access and equity. This leads to customer dissatisfaction as well as inefficient processes and output.

- **Identification of variation.** Typically variation can be classified into two types:
  - **Common Cause.** Common-cause variation appears as random variation in all measures from healthcare processes.
  - **Special Cause.** Special-cause variation appears as the effect of causes outside the core processes of the work.

Management can reduce this variation by enabling the easy recognition of special-cause variation and by changing healthcare processes by DMAIC six sigma methodology. Six sigma's main objective is to minimize variation. Following are the various activities for six sigma quality program.

- **Define.**
  - **Goal establishment.** This comprises of establishing and defining target to achieve. For example, reduction in infection cases by 25%.
  - **Establish tasks.** This involves setting up of task:
    - Implicit task. Implicit task which can be accomplished via automation.
    - Explicit task. Explicit tasks which require human intervention.
- **Measure.**

This refers to the collection of data and measuring techniques. This involves following:

- **Identification of parameters.** This involves identification of :
  - Population. The actual target audience of the data collection.
  - Sampling. The sample representation of the population.
  - Hypothesis. Test to ensure that the sample selected is actual representation of the population.
  - Sample size. The optimal sample size to establish purposeful results
- **Data collection.** This comprises of following:
  - Instantaneous data collection. This refers to a conditions where by certain events can result into instantaneous data collection, for example a patient profile shows TB, would be a instantaneous data source rather than identification of microbes in the environmental conditions
  - Implicit plan. This refers to the computer generated automated plan.

- **Explicit plan.** This refers to the scenario whereby data collection is done for certain situations such as infection outbreaks and requires human intervention.

- **Sampling techniques.**

This comprise of following:

- **Simple random sampling**

In a simple random sample ('SRS') of a given size, all such subsets of the frame are given an equal probability. Each element of the frame thus has an equal probability of selection: the frame is not subdivided or partitioned

- **Systematic sampling**

Systematic sampling relies on arranging the target population according to some ordering scheme and then selecting elements at regular intervals through that ordered list.

- **Stratified sampling**

Where the population embraces a number of distinct categories, the frame can be organized by these categories into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected

- **Line-intercept sampling**

Line-intercept sampling is a method of sampling elements in a region whereby an element is sampled if a chosen line segment, called a "transect", intersects the element

- **Analyze Phase**

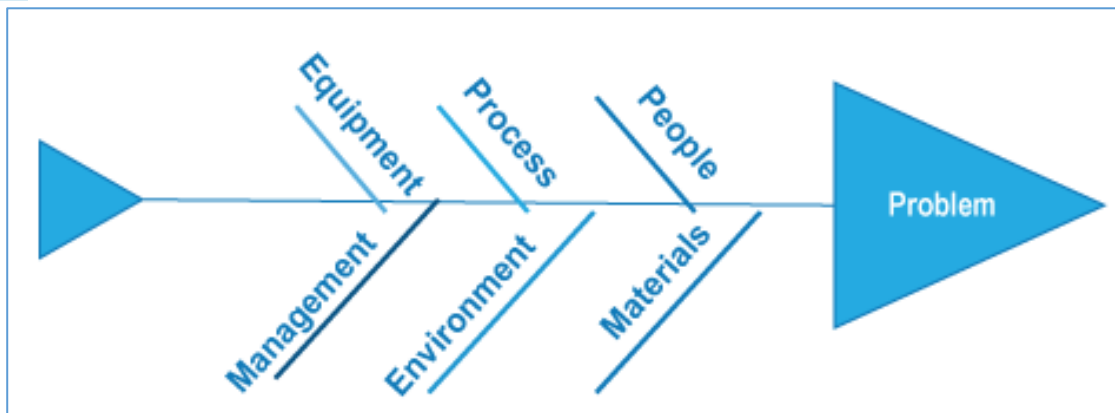
In the Analyze phase, information gathered in the Measure phase, is analyzed to pinpoints the root cause of variation, and identify improvement opportunities where non-value-add tasks can be removed. Following are various methods to do so:

- **Ishikawa Diagram.** This method can be useful in helping identify where something may be going wrong, or be improved. Such a diagram is typically the outcome of a brainstorming session where problem solvers can offer suggestions. The main goal is represented by the trunk of the diagram, and primary factors are represented as branches. Secondary factors are then added as stems, and so on. Creating the diagram stimulates discussion and often leads to increased understanding of a complex problem.

Causes are usually grouped into major categories to identify the sources of problem. The categories typically include:

- **People:** Anyone involved with the process
- **Process:** How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations and laws
- **Equipment:** Any equipment, computers, tools etc. required to accomplish the job

- **Materials:** Raw materials, parts, pens, paper, etc. used to produce the final product
- **Management:** Management related issues, decisions.
- **Environment:** The conditions, such as location, time, temperature, and culture in which the process operates.



- **Pareto Analysis.** This is a technique for separating important potential causes from more trivial issues. The following steps should be taken:
  - Form a table listing the causes and their frequency as a percentage.
  - Arrange the rows in the decreasing order of importance of the causes, i.e. the most important cause first.
  - Add a cumulative percentage column to the table

Pareto Analysis signifies 80-20 rule, meaning that by doing 20% of work, 80% of the advantage of doing the entire job can be generated. Or in terms of Problem Management, a large majority of problems (80%) are produced by a few key causes (20%). This technique helps to identify the top 20% of causes that needs to be addressed to resolve the 80% of the problems. Once the top 20% of the causes are identified, then tools like the Ishikawa diagram or Fish-bone Analysis to be used to identify the root causes of the problems.

- **Root cause Analysis tree.**

Root cause analysis tree is a structured evaluation method that identifies the root causes for an undesired outcome and the actions adequate to prevent recurrence. Root cause tree analysis continues until organizational factors have been identified, or until data are exhausted. Root cause tree analysis

enables organization to make informed decisions and also serve as a mean to implement close loop knowledge management in the organization. The root cause analysis can be utilized by any employee irrespective of his background and skill level to rectify a problem.

- **Improve Phase.**

The Improve phase is when findings are implemented, workflows are streamlined and variations removed.

- **Control Phase.**

This involves implementing monitoring and sustaining procedures to facilitate over all improvisation.

## 5.2.3 Establish Continuous Improvement Practices

Quality improvement consists of a wide array of managerial and organizational activities designed to streamline production processes, to remove waste and unpredictability, and to achieve previously unprecedented levels of performance.

This comprises of establishing various continuous improvement practices, for following continuous improvement domain.

Continuous Improvement Domains	Improvement Areas	Continuous Improvement Practices
<b>Management</b>	<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Mission and shared vision</li> <li>• Targets</li> <li>• Resources</li> <li>• Favourable changes in organisation</li> </ul>	<ul style="list-style-type: none"> <li>• Set targets based on realistic expectations towards practice development and long term policy of the professional organisation</li> <li>• Make plans on improvement</li> <li>• Establish priorities towards subjects that particularly need improvement</li> <li>• Designate a staff as the quality coordinator</li> <li>• Hold quality meetings with all staff at regular intervals (for example, once a month)</li> <li>• Establish a quality board in practice</li> <li>• Integrate the activities in daily work</li> </ul>
<b>Record keeping</b>	<ul style="list-style-type: none"> <li>• Performance measures</li> <li>• Analysis of the organisation</li> <li>• Satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>• Collect data on specific subjects (according to priorities set or projects run and including patient satisfaction), if possible form electronic medical</li> </ul>

		<p>files (other sources include insurers, laboratories, pharmacists, appraisals, etc)</p> <ul style="list-style-type: none"> <li>• Make annual / monthly/ quarterly reports on outcomes of care</li> <li>• Make annual reports on improvement activities</li> </ul>
<b>Systematic approach</b>	<ul style="list-style-type: none"> <li>• Planned activities</li> <li>• Use of the quality cycle</li> <li>• Use of specific tools and techniques</li> <li>• Learn from experience</li> </ul>	<ul style="list-style-type: none"> <li>• Run small improvement projects on prioritised issues (management of chronic disease, preventive activities, accessibility, workload)</li> <li>• Use tools and techniques that are simple to use and not time consuming (brainstorming, analysis of strengths and weaknesses, flow charts, cause and effect diagrams, etc)</li> <li>• Aim at changes in which existing processes are adapted or re-engineered (and build on experience) (ideas to improve processes can come from peer review, continuing medical education, guidelines, publications, etc)</li> </ul>
<b>Collaboration</b>	<ul style="list-style-type: none"> <li>• Everyone involved</li> <li>• Positive attitude towards continuous quality improvement</li> <li>• Team building</li> <li>• Participation</li> </ul>	<ul style="list-style-type: none"> <li>• Involve everyone in quality improvement activities (everyone is aware of tasks and responsibilities)</li> <li>• Build teams for systematic improvement activities</li> <li>• Involve patients (and other external customers) in improvement activities</li> </ul>

## 5.2.4 Identification of Anomaly

Anomaly is identified via following sources:

- **Anomaly detection system.** Issues detected by automated anomaly detection system. Various techniques can be utilized to detect anomaly such as:
  - Neural Networks
  - K-nearest neighbor
  - Cluster Analysis
  - Vector Machine

- **Other coordination process.** Issues discovered via other coordination process which signify a potential anomaly.
- **Customer report.** Issues reported by customer which signify a potential anomaly.

## 5.2.5 Anomaly Report

This comprise of following:

- Unique Anomaly ID (assigned automatically by the system)
- Reported date and time (allocated automatically by the system)
- Anomaly Details / Description
- Related Service(s)
- Relevant SLA information
- Anomaly Priority and Category

## 5.2.6 Anomaly categorization & prioritization

Anomaly is categorized and hence prioritized based on:

- Severity /Urgency of the incident (how quickly the business needs a resolution) and
- The level of impact it is causing

The table below shows the means to identify the priority of the anomaly.

IMPACT	URGENCY			
	Critical	High	Medium	Low
Extensive	Critical	Critical	High	Low
Significant	Critical	High	Medium	Low
Moderate	High	High	Medium	Low
Minor	High	Medium	Medium	Low



## 5.2.7 Anomaly Diagnosis

This comprises of investigating and analyzing following:

- **Nature of input data.** This comprise of identification of the nature of attributes of input data (binary, categorical, continuous, hybrid) and relationship amongst data instance (sequential, spartial, graphic)
- **Identification of type of anomaly.** To identify whether the anomaly is:
  - **Point anomaly.** Refers to an individual data instance with respect to the entire data
  - **Contextual anomaly.** Refers to a scenario whereby data instance is anomalous within a context.
  - **Collective anomaly.** Refers to a scenario where by related data instance are anomalous.
- **Evaluation of Anomaly.** Evaluation of anomaly and identification of a corrective action plan.

## 5.2.8 Implement corrective action plan

This comprises of implementing the anomaly corrective action plan.

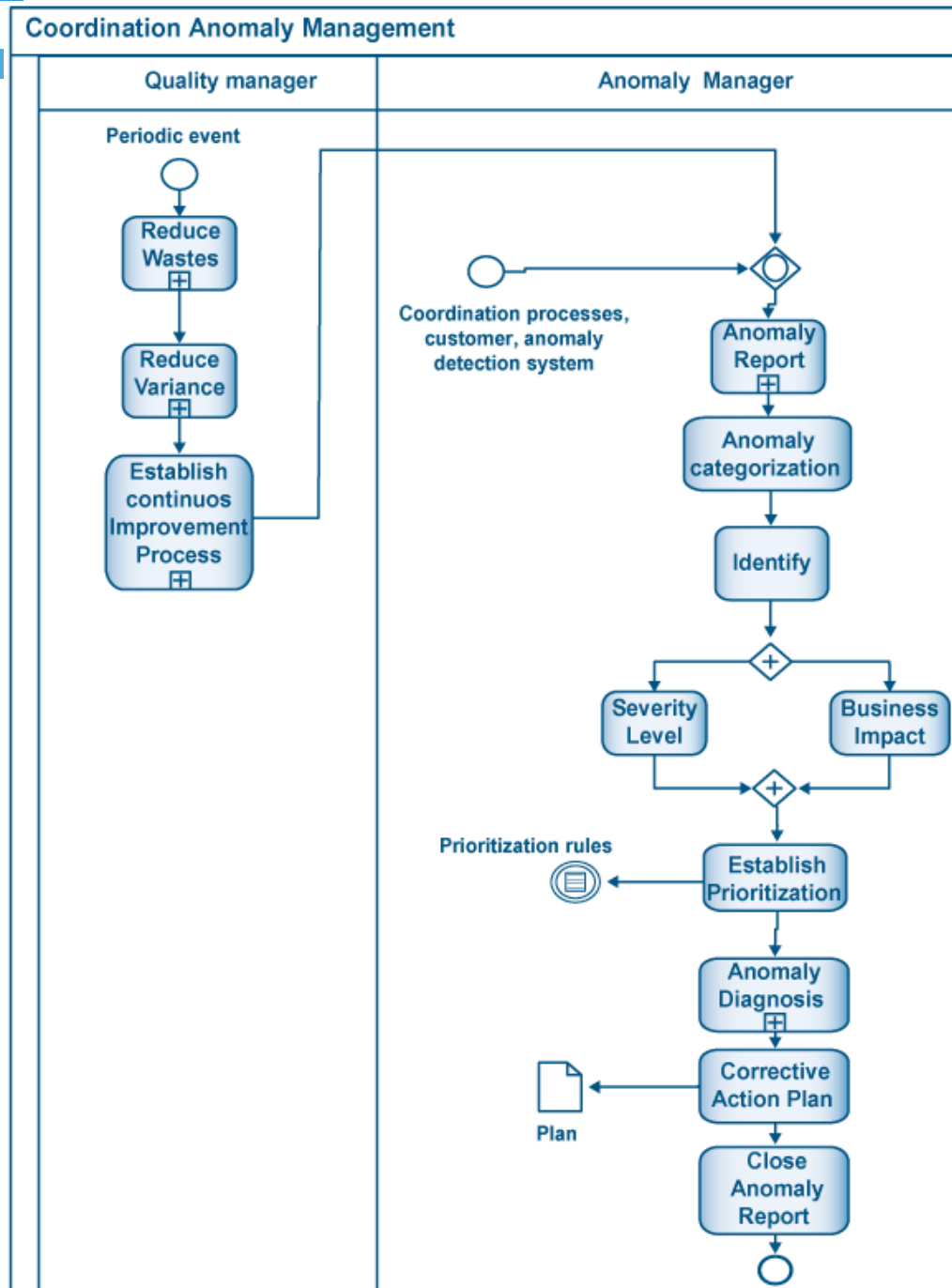
## 5.2.9 Close Anomaly report

When anomaly is resolved, the Anomaly Record is formally closed. A check shall be performed at this stage to ensure that the record contains a full historical description of all events.

## Coordination Anomaly Management Process



## 6.1 Process Model



## 6.2 Process Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to create Coordination Anomaly Management process for environmental services.
<b>Scope</b>	This is a Level 1 Process Specification.
<b>Primary Reference</b>	Lean Six Sigma Standard
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Identification and management of anomaly.
<b>Related Operational Policies</b>	OP-001, OP-002, OP-003, OP-004, OP-005 (Ref. 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Inputs to the process are accurate.</li> <li>Top level management commitment exists.</li> </ul>
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	<ul style="list-style-type: none"> <li>Automated System for coordination anomaly management.</li> </ul>

# 6

## Coordination Anomaly Management Process

<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>• Periodic event</li> <li>• Customer, coordination processes, anomaly detection system</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Coordination Anomaly Management</b></p> <ol style="list-style-type: none"> <li>1. Quality manager establishes process waste control model</li> <li>2. Quality manager reduces process variations</li> <li>3. Quality manager continuous improvement practices</li> <li>4. Anomaly Manager establishes anomaly report</li> <li>5. Anomaly Manager performs anomaly categorization</li> <li>6. Anomaly Manager identifies severity level and business impact</li> <li>7. Anomaly Manager establishes prioritization</li> <li>8. Anomaly Manager performs anomaly diagnosis</li> <li>9. Anomaly Manager establishes corrective action plan.</li> <li>10. Anomaly Manager closes anomaly report.</li> <li>11. End</li> </ol>						
<b>Alternative Path</b>	<p><b>Anomaly management (customer, coordination processes, anomaly detection)</b></p> <ol style="list-style-type: none"> <li>1. Anomaly Manager establishes anomaly report</li> <li>2. Anomaly Manager performs anomaly categorization</li> <li>3. Anomaly Manager identifies severity level and business impact</li> <li>4. Anomaly Manager establishes prioritization</li> <li>5. Anomaly Manager performs anomaly diagnosis</li> <li>6. Anomaly Manager establishes corrective action plan.</li> <li>7. Anomaly Manager closes anomaly report</li> <li>8. End.</li> </ol>						

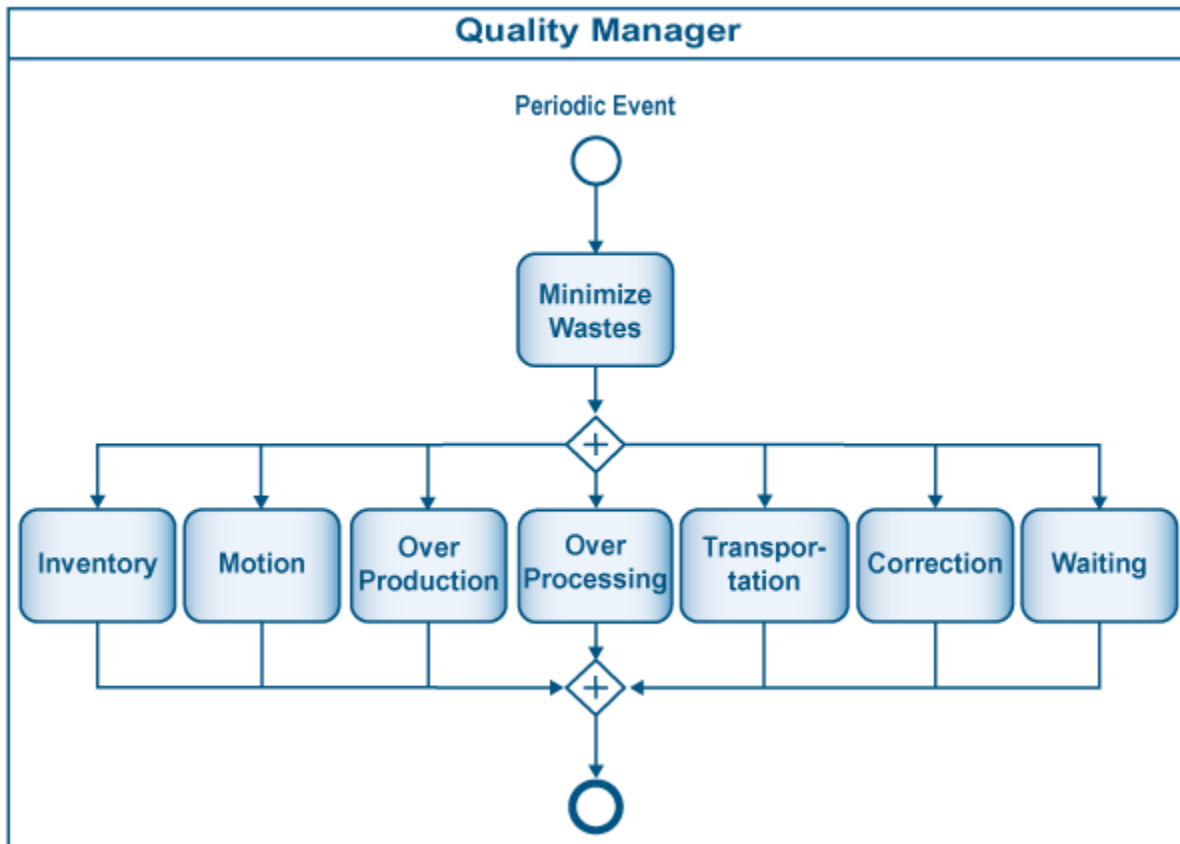
<b>Exception Path</b>	<b>System Down</b> <ol style="list-style-type: none"> <li>1. Keep paper track until system is up and running</li> <li>2. Update the System and clear all logs.</li> <li>3. End.</li> </ol>
<b>Extension points</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Preconditions</b>	Automated anomaly detected capability exists.
<b>Post -conditions</b>	Coordination Anomaly Management process is established.
<b>Related Business Rules</b>	BR-001, BR-002, BR-003, BR-004, BR-005 (Ref 7.1)
<b>Related Risks</b>	RR-001, RR-002, RR-003, RR-004, RR-005, RR-006, RR-007, RR-008(Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Availability, Accountability, Performance, Auditability, confidentiality, non repudiation, adaptability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Reputation, Objectivity, free of error, Relevance, completeness, timeliness, understandability, concise representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	TTRA, ARR, PAR, CAR, CTAR, WMR, VR, ITR (Ref 7.6)
<b>Related CTQs</b>	TTRAV, ARRV, PARV, CARV, CTARV, MOM, PWOM, CTQ, IOM, TOM, WRM, DRM, WMRV, VRV, ITRV (Ref 7.7)
<b>Actors/Agents</b>	Anomaly Manager
<b>Delegation</b>	<u>Delegation Rule -1: Agent Not Available</u> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <u>Delegation Rule -2: Agent Overloaded</u> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> </ol>

	<ol style="list-style-type: none"> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1
<b>Process Model</b>	6.1
<b>Other References</b>	<p>Appendix A: Business Process Modeling Notation Reference</p> <p>Appendix B: Chain of Infection</p>

## 6.3 Roles and Responsibilities

Roles	Responsibilities
<b>Anomaly Manager</b>	<ul style="list-style-type: none"> <li>• Anomaly Manager establishes anomaly report</li> <li>• Anomaly Manager performs anomaly categorization</li> <li>• Anomaly Manager identifies severity level and business impact</li> <li>• Anomaly Manager establishes prioritization</li> <li>• Anomaly Manager performs anomaly diagnosis</li> <li>• Anomaly Manager establishes corrective action plan.</li> <li>• Anomaly Manager closes anomaly report.</li> </ul>
<b>Quality Manager</b>	<ul style="list-style-type: none"> <li>• Quality manager establishes waste control</li> <li>• Quality manager performs variance reduction</li> <li>• Quality manager performs continuous process improvement activities.</li> </ul>

## 6.4 Sub Process – Establish Waste Control Quality model





## 6.5 Sub Process – Establish Waste Control Quality model Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish waste quality process.
<b>Scope</b>	This is a level 1 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>Lean Six sigma</li> </ul>
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Reduction of wastes and improvement of quality.
<b>Related Operational Policies</b>	OP-003 (Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	Automated System for anomalies quality control

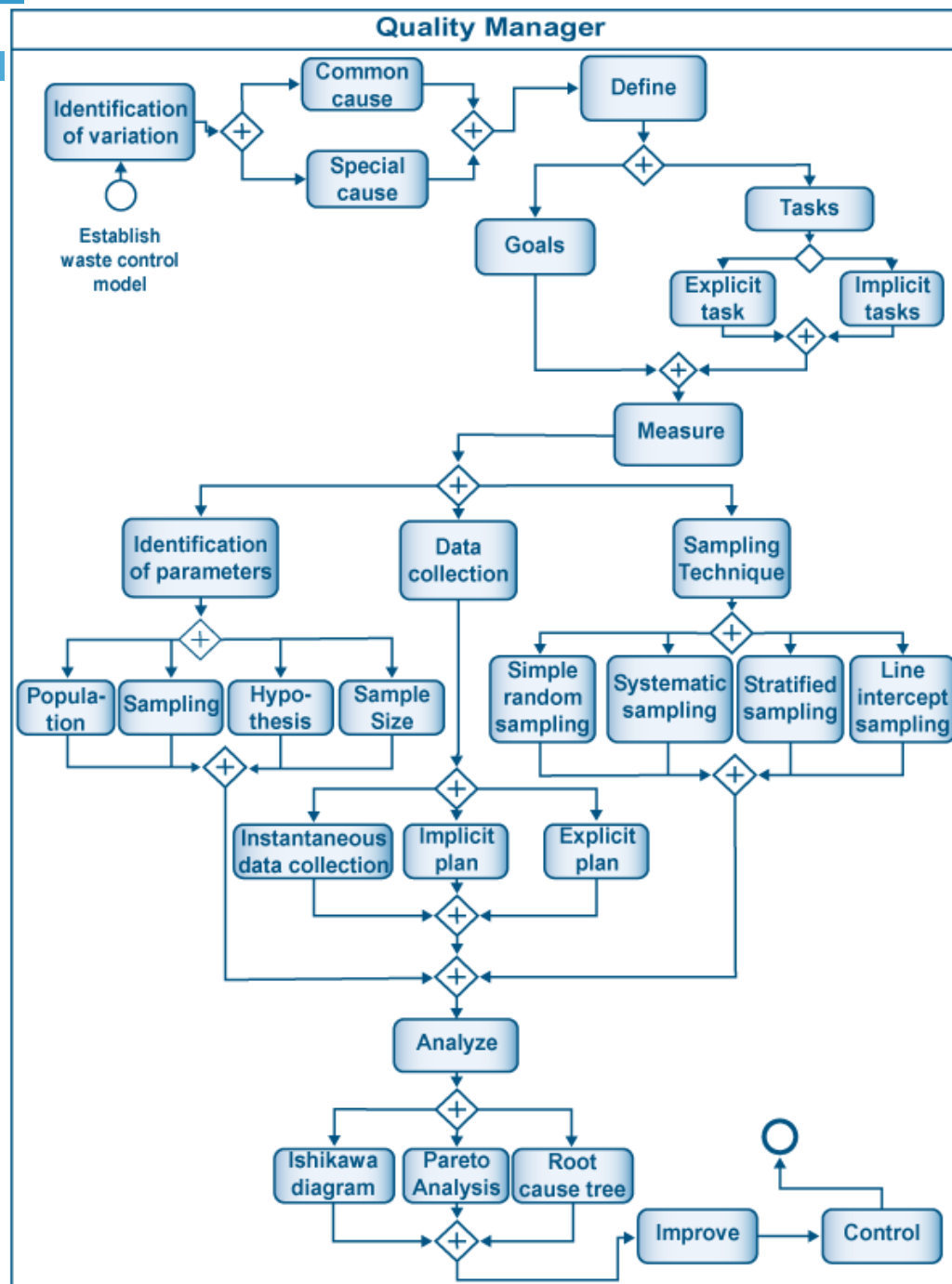
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Periodic event</li> </ul>						
<b>Basic Course of Event</b>	<b>Waste Quality control model</b> <ol style="list-style-type: none"> <li>Quality manager minimizes wastes (inventory, motion, over production, transportation, correction, idle time, knowledge, material, equipment)</li> <li>End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<b>System Down</b> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>						
<b>Extension points</b>	Reduce variation						
<b>Preconditions</b>	There exists a capability at environmental Services department to monitor the performance of anomalies coordination process.						
<b>Post -conditions</b>	Anomalies quality control gets formulated.						
<b>Related Business Rules</b>	BR-003 (Ref 7.1)						
<b>Related Risks</b>	RR-006 (Ref. 7.2)						
<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability						

	(Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	WMR (Ref 7.6)
<b>Related CTQs</b>	WMRV (Ref 7.7)
<b>Actors/Agents</b>	Quality Manager
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	Section 5.1
<b>Process Model</b>	Section 6.4
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.6 Sub Process – Establish Waste Control Quality Model Roles and responsibilities

Roles	Responsibilities
<b>Quality Manager</b>	Quality manager minimizes wastes (inventory, motion, over production, transportation, correction, idle time)

## 6.7 Sub Process – Reduce variation



## 6.8 Sub Process – Reduce Variation Specifications

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish six sigma approach for quality control process.
<b>Scope</b>	This is a level 1 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>• Lean waste minimization</li> <li>• Six sigma quality model</li> </ul>
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Perfection and accuracy
<b>Related Operational Policies</b>	OP-004(Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	Automated System for anomalies coordination management
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)

<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Waste control model</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Reduce variation</b></p> <ol style="list-style-type: none"> <li>Quality manager identifies variation (common cause and specific cause)</li> <li>Quality manager defines quality goals and related task (explicit as well as implicit tasks)</li> <li>Quality Manager establishes measure phases (identification of parameters (population, sampling, hypothesis, sample size) data collection categories (instantaneous data collection, implicit plan and explicit plan) and sampling techniques (simple random sampling, systematic sampling, stratified sampling, line intercept sampling)</li> <li>Quality Manager establishes analyzes phase (via ishikawa diagram, pareto analysis and root cause tree)</li> <li>Quality Manager improves the overall procedures and work flow</li> <li>Quality manager controls the process.</li> <li>End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>						
<b>Extension points</b>	Establish continuous improvement practices.						
<b>Preconditions</b>	There exists a capability to monitor the performance of coordination anomaly management						
<b>Post -conditions</b>	Six sigma approached based variation control process gets formulated.						

<b>Related Business Rules</b>	BR-004 (Ref 7.1)
<b>Related Risks</b>	RR-007(Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability. (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation. (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	VR (Ref 7.6)
<b>Related CTQs</b>	VRV (Ref 7.7)
<b>Actors/Agents</b>	Quality Manager
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	Section 5.1

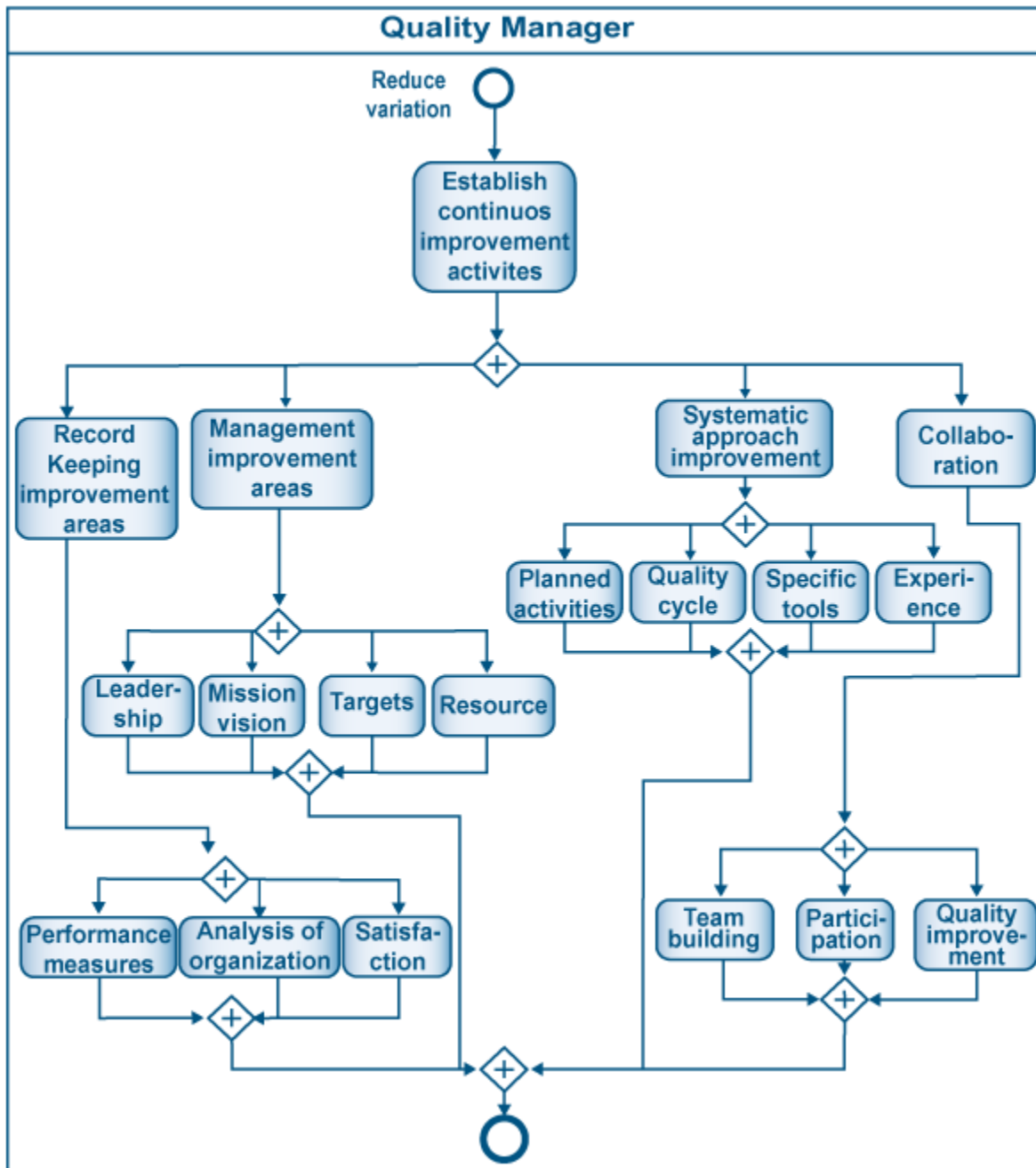


<b>Process Model</b>	Section 6.7
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.9 Sub Process – Reduce Variation Roles and responsibilities

Roles	Responsibilities
<b>Quality Manager</b>	<ul style="list-style-type: none"> <li>• Quality manager identifies variation (common cause and specific cause)</li> <li>• Quality manager defines quality goals and related task (explicit as well as implicit tasks)</li> <li>• Quality Manager establishes measure phases (identification of parameters (population, sampling, hypothesis, sample size) data collection categories (instantaneous data collection, implicit plan and explicit plan) and sampling techniques (simple random sampling, systematic sampling, stratified sampling, line intercept sampling)</li> <li>• Quality Manager establishes analyzes phase (via ishikawa diagram, pareto analysis and root cause tree)</li> <li>• Quality Manager improves the overall procedures and work flow</li> <li>• Quality manager controls the process.</li> </ul>

## 6.10 Sub Process – Establish Continuous Improvement Practices



## 6.11 Sub Process – Establish Continuous Improvement Practices Specifications

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish continuous improvement practices.
<b>Scope</b>	This is a level 1 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>• Lean waste minimization</li> <li>• Six sigma quality model</li> </ul>
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Continuous improvement
<b>Related Operational Policies</b>	OP-005(Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	Automated System for anomalies management

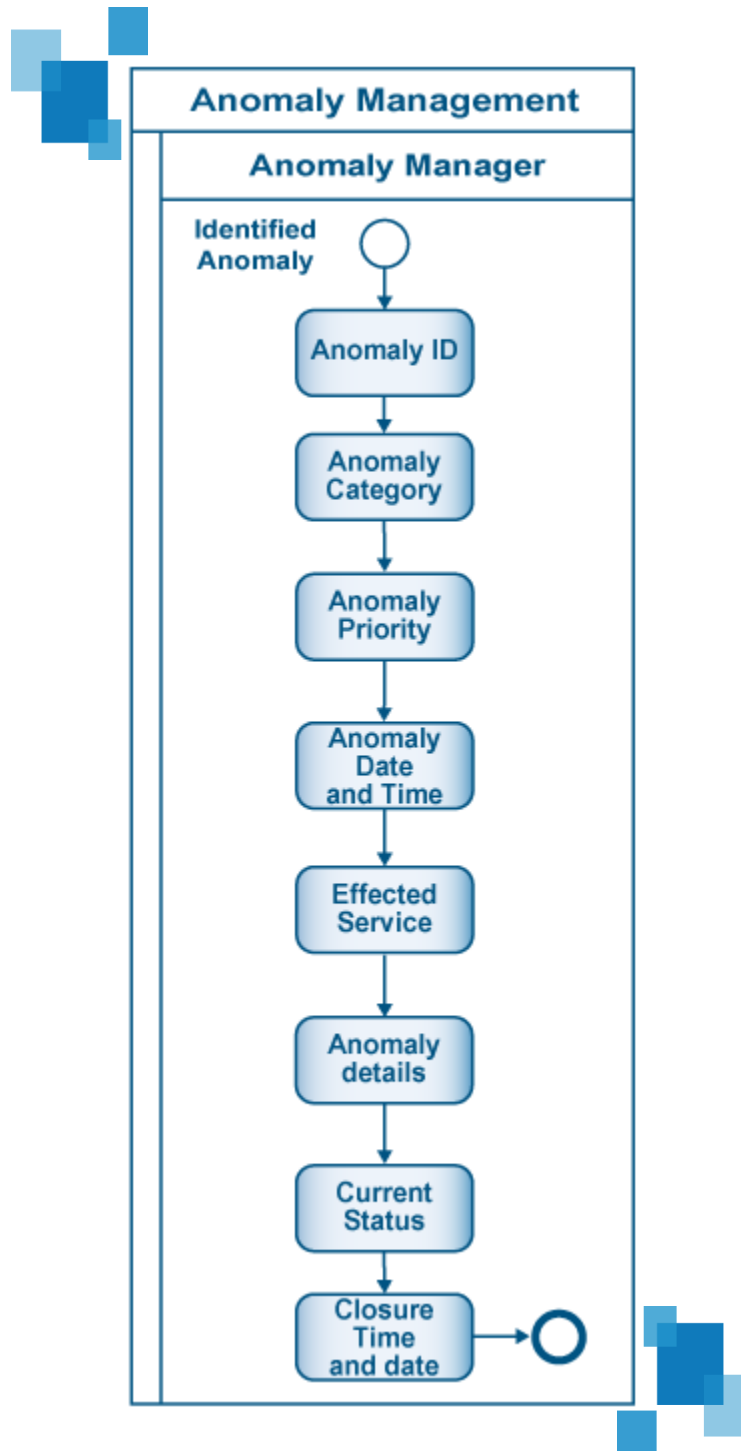
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Reduce variation</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Continuous Improvement process</b></p> <ol style="list-style-type: none"> <li>Quality manager establish continuous improvement activities for record keeping improvement areas (performance measures, analysis of organization, satisfaction), management improvement areas (leadership, mission &amp; vision, targets, resource), systematic approach improvement (planned activities, quality cycle, specific tools, experience) and collaboration (team building, participation, quality improvement)</li> <li>End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>						
<b>Extension points</b>	Anomaly reporting						
<b>Preconditions</b>	There exists a capability to monitor the performance of coordination anomaly management						
<b>Post -conditions</b>	A continuous improvement practice gets formulated.						
<b>Related Business Rules</b>	BR-005 (Ref 7.1)						
<b>Related Risks</b>	RR-008(Ref. 7.2)						

<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	ITR (Ref 7.6)
<b>Related CTQs</b>	ITRV (Ref 7.7)
<b>Actors/Agents</b>	Quality Manager
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	Section 5.1
<b>Process Model</b>	Section 6.10
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.12 Sub Process – Establish Continuous Improvement Practices Roles and responsibilities

Roles	Responsibilities
<b>Quality Manager</b>	Quality manager establish continuous improvement activities for record keeping improvement areas (performance measures, analysis of organization, satisfaction), management improvement areas (leadership, mission & vision, targets, resource), systematic approach improvement (planned activities, quality cycle, specific tools, experience) and collaboration (team building, participation, quality improvement)

## 6.13 Sub Process – Anomaly Report



## 6.14 Sub Process – Anomaly Report Specification

Specification	Description
<b>Summary/Purpose</b>	To establish the process of creation of Anomaly report
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Lean Six Sigma standard
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Accurate recording of Anomalies
<b>Related Operational Policies</b>	OP-001 (Ref. 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Inputs to the process are accurate.</li> </ul>
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	<ul style="list-style-type: none"> <li>Automated System for coordination anomaly management.</li> </ul>
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
<b>EBC Procedures</b>	None



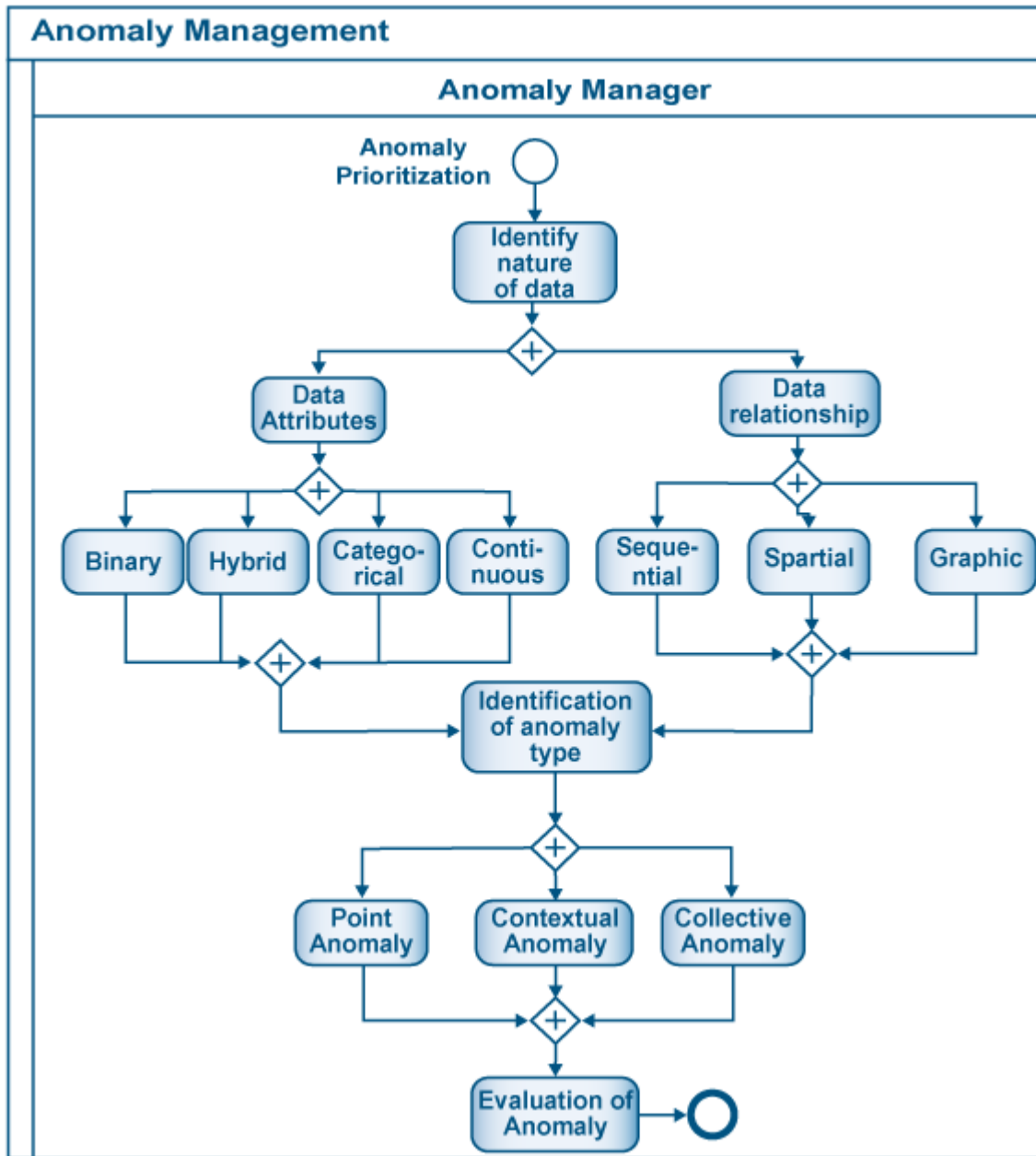
Timing Dimension	<b>Type</b>	Normal
	<b>Average</b>	30 min
	<b>Std</b>	12 min
Trigger	<ul style="list-style-type: none"> <li>Identified anomaly</li> </ul>	
Basic Course of Event	<p><b><u>Anomaly record</u></b></p> <ol style="list-style-type: none"> <li>Anomaly Manager establishes anomaly record (anomaly ID, Anomaly category, Anomaly Priority, Anomaly Date and time, Effected services, anomaly details, current status and closure time and date)</li> <li>End</li> </ol>	
Alternative Path	None	
Exception Path	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>	
Extension points	Anomaly categorization.	
Preconditions	There exists a Anomaly recording system	
Post -conditions	Anomaly record is created.	
Related Business Rules	BR-002 (Ref 7.1)	
Related Risks	RR-004(Ref. 7.2)	
Related Quality Attributes	Reliability, Accountability, Performance, Auditability, Extensibility (Ref 7.3)	
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, free of error, Relevance, completeness, Value added, Believability (Ref 7.4)	
Related Primary SLA Terms	(Ref 7.9)	

<b>Related KPIs</b>	ARR(Ref 7.6)
<b>Related CTQs</b>	ARRV (Ref 7.7)
<b>Actors/Agents</b>	Anomaly Manager
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1
<b>Process Model</b>	6.4
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.15 Sub Process – Anomaly Report Roles and Responsibilities

Roles	Responsibilities
<b>Anomaly Manager</b>	Anomaly Manager establishes anomaly record (anomaly ID, Anomaly category, Anomaly Priority, Anomaly Date and time, Effected services, anomaly details, current status and closure time and date)

## 6.16 Sub Process – Anomaly Diagnosis



## 6.17 Sub Process – Anomaly Diagnosis Specification

Specification	Description
<b>Summary/Purpose</b>	To establish the process of anomaly diagnosis.
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Lean Six Sigma standard
<b>Related ESM Practices</b>	Quality coordination, Nurse coordination, security coordination, hospital information system coordination, inter environment services coordination, infection control coordination.
<b>Related Business Driver</b>	Resolution and management of anomalies.
<b>Related Operational Policies</b>	OP-002 (Ref. 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Inputs to the process are accurate.</li> </ul>
<b>Voice of Customer</b>	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	<ul style="list-style-type: none"> <li>Automated System for coordination anomaly management.</li> </ul>
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
<b>EBC Procedures</b>	None

Timing Dimension	Type	Normal
	Average	30 min
	Std	12 min
Trigger	<ul style="list-style-type: none"> <li>Establish priority</li> </ul>	
Basic Course of Event	<p><b>Anomaly diagnosis</b></p> <ol style="list-style-type: none"> <li>Anomaly Manager identifies nature of data ( data attributes {binary, hybrid, categorical, continuous}) and data relationship {sequential, spatial and graphic})</li> <li>Anomaly Manager identifies the type of anomaly (point anomaly, contextual anomaly, collective anomaly)</li> <li>Anomaly Manager performs evaluation of anomaly.</li> <li>End</li> </ol>	
Alternative Path	None	
Exception Path	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>	
Extension points	Close anomaly report	
Preconditions	There exists an Anomaly analysis capability.	
Post -conditions	The anomaly is resolved.	
Related Business Rules	BR-001 (Ref 7.1)	
Related Risks	RR-005(Ref. 7.2)	
Related Quality Attributes	Reliability, Accountability, Performance, Auditability, Extensibility (Ref 7.3)	
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, free of error, Relevance, completeness, Value added, Believability (Ref 7.4)	

<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	PAR, CAR, CTAR(Ref 7.6)
<b>Related CTQs</b>	PARV, CARV, CTARV (Ref 7.7)
<b>Actors/Agents</b>	Anomaly Manager.
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1
<b>Process Model</b>	6.7
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.18 Sub Process – Anomaly Diagnosis Roles and Responsibilities

Roles	Responsibilities
<b>Anomaly Manager</b>	<ul style="list-style-type: none"><li>• Anomaly Manager identifies nature of data ( data attributes {binary, hybrid, categorical, continuous}) and data relationship {sequential, spatial and graphic})</li><li>• Anomaly Manager identifies the type of anomaly (point anomaly, contextual anomaly, collective anomaly)</li><li>• Anomaly Manager performs evaluation of anomaly.</li></ul>

## Reference





# 7 Reference

This chapter serves as a prime reference to Chapter 6 and presents the details supporting Chapter 6 in tabular formats. This chapter consists of various variable values which would frequently evolve or change as organization's Environmental Services' Coordination Anomaly Management process matures or changes.

At minimal this document can be updated biannually. However, if need arises this document may be updated earlier than its prescribed revision period.

## 7.1 Business Rules

BR ID	Description	Context	Rule	Source
BR-001	It is mandatory to know the root cause of all anomalies.	Operations	TBD	NA
BR-002	All anomalies reported would be recorded	Operations	TBD	NA
BR-003	All wastes should be minimized.	Business	TBD	TBD
BR-004	Lean Six sigma would be use as the prime standard for variance minimization	Business	TBD	TBD
BR-005	All quality initiatives should be improvised.	Business	TBD	TBD

## 7.2 Risk

Risk ID	Description	Source	Severity Level	Status	Resolution
RR-001	Only one Anomaly Manager	NA	Medium	NA	To train other resource on problem management
RR-002	Resources not provided to Anomaly Manager to identify root cause	NA	High	NA	To establish better communication means, and involve top management when required.

RR-003	The priority of Anomaly changes in course of time	NA	Medium	NA	Frequently Monitor the priority of the problem and update when required.
RR-004	Records lack accuracy	TBD	high	NA	All records should be properly audited time to time to ensure its accuracy.
RR-005	In order to facilitate the investigation and diagnosis there does not exist any test environment.	NA	High	NA	Detailed testing of the anomaly should be conducted before its releasing its fix in the live environment.
RR-006	Waste minimization measure are not effective	NA	High	TBD	Waste minimization KPI should be established are accurately measured.
RR-007	Staff do not follow the quality program	NA	High	TBD	Staff should be well trained and familiarized with the quality process so that they would act as desired.
RR-008	The improvement practices are not in line with the goals	NA	High	TBD	The improvement practices should be aligned to the target objective via proper discussion so that it is acceptable to all.

### 7.3 Quality Attribute

QA ID	Description	Threshold
QA-001	Interoperability	TBD
QA-002	Reliability	TBD

QA-003	Service Reliability	TBD
QA-004	Availability	TBD
QA-005	Usability	TBD
QA-006	Normal Usability Operations	TBD
QA-007	Confidentiality	TBD
QA-008	Authenticity	TBD
QA-009	Data Integrity	TBD
QA-010	Availability	TBD
QA-011	Non-repudiation	TBD
QA-012	Accountability	TBD
QA-013	Security Integration	TBD
QA-014	Performance	TBD
QA-015	Scalability	TBD
QA-016	Extensibility	TBD
QA-017	Adaptability	TBD
QA-018	Testability	TBD
QA-019	Auditability	TBD
QA-020	Operability and Deployability	TBD

## 7.4 Data Quality Dimensions

DQ ID	Description	Threshold
DQ-001	Accuracy	TBD
DQ-002	Believability	TBD
DQ-003	Reputation	TBD
DQ-004	Objectivity	TBD
DQ-005	Free-of-Error	TBD
DQ-006	Value Added	TBD
DQ-007	Relevance	TBD
DQ-008	Completeness	TBD
DQ-009	Timeliness	TBD
DQ-010	Appropriate Amount	TBD
DQ-011	Understandability	TBD
DQ-012	Interpretability	TBD
DQ-013	Concise Representation	TBD

## 7.5 Operation Policy

Policy ID	Description	Context	Importance (1-5)
OP-001	All Anomalies reported would be verified before establishing anomaly report.	Operations	TBD

<b>OP-002</b>	All anomalies would be investigated and analysed using automated tools to ensure accuracy and reliability of results	Operations	TBD
<b>OP-003</b>	Waste minimization would be done in following perspectives: inventory, motion, over production, over processing, transportation, correction, waiting	TBD	TBD
<b>OP-004</b>	All staff which deal with the performance of this process would be fully trained six sigma trained	TBD	TBD
<b>OP-005</b>	Improvements should be monitored regularly	TBD	TBD

## 7.6 KPI

Name	Acronym	Description	Context	Importance	Soft Threshold	Hard Threshold
<b>Time to resolve Anomaly</b>	<b>TTRA</b>	Defines the cycle time to complete the problem resolution process	TBD	TBD	TBD	TBD
<b>Anomaly report rate</b>	<b>ARR</b>	Number of Anomalies reported per month	TBD	TBD	TBD	TBD
<b>Point anomaly rate</b>	<b>PAR</b>	Number of point anomalies reported per year	TBD	TBD	TBD	TBD
<b>Contextual anomaly rate</b>	<b>CAR</b>	Number of contextual anomalies reported per year	TBD	TBD	TBD	TBD

<b>Collective Anomaly rate</b>	<b>CTAR</b>	Number of collective anomalies reported per year	TBD	TBD	TBD	TBD
<b>Waste minimization rate</b>	<b>WMR</b>	Percentage increase in waste minimization	NA	TBD	TBD	TBD
<b>Variation rate</b>	<b>VR</b>	percentage decrease in variation	NA	TBD	TBD	TBD
<b>Improvement Target rate</b>	<b>ITR</b>	Number of improvement targets met per month	NA	TBD	TBD	TBD

## 7.7 CTQ

<b>Name</b>	<b>Acronym</b>	<b>Description</b>	<b>Context</b>	<b>Importance</b>	<b>Soft Threshold</b>	<b>Hard Threshold</b>
<b>Time to resolve Anomaly variation</b>	<b>TTRAV</b>	Standard deviation of TTRA	NA	TBD	TBD	TBD
<b>Anomaly report rate variation</b>	<b>ARRV</b>	Standard deviation of ARR	NA	TBD	TBD	TBD
<b>Point anomaly rate variation</b>	<b>PARV</b>	Standard deviation of PAR	NA	TBD	TBD	TBD
<b>Contextual anomaly rate variation</b>	<b>CARV</b>	Standard deviation of CAR	NA	TBD	TBD	TBD

<b>Collective Anomaly rate variation</b>	<b>CTARV</b>	Standard deviation of CTAR	NA	TBD	TBD	TBD
<b>Motion Optimization Measure</b>	<b>MOM</b>	Management of motion optimization measure	NA	TBD	TBD	TBD
<b>Paper work Optimization Measure</b>	<b>PWOM</b>	Management of Paper work Optimization Measure	NA	TBD	TBD	TBD
<b>Correction reduction measure</b>	<b>CRM</b>	Management of Correction reduction measure	NA	TBD	TBD	TBD
<b>Materials Optimization Measure</b>	<b>IOM</b>	Management of Materials Optimization Measure	NA	TBD	TBD	TBD
<b>Transportation Optimization Measure</b>	<b>TOM</b>	Management of Transportation Optimization Measure	NA	TBD	TBD	TBD
<b>Waiting Reduction Measure</b>	<b>WRM</b>	Management of Waiting reduction Measure	NA	TBD	TBD	TBD
<b>Delays reduction measure</b>	<b>DRM</b>	Management of delays reduction measure	NA	TBD	TBD	TBD

# 7 Reference

<b>Waste minimization rate variation</b>	<b>WMRV</b>	Standard deviation of WMR	NA	TBD	TBD	TBD
<b>Variation rate variation</b>	<b>VRV</b>	Standard deviation of VR	NA	TBD	TBD	TBD
<b>Improvement Target rate variation</b>	<b>ITRV</b>	Standard deviation of ITR	NA	TBD	TBD	TBD

## 7.8 Abstract Time – Scale

Name	Acronym	Description	Quantification
TBD	TBD	TBD	TBD

## 7.9 SLA Terms

SLA ID	Description	Context	KPI	CTQ
TBD	TBD	TBD	TBD	TBD

## 7.10 Voice of Customer

VOC	Customer	Description	Perceived Value
<b>Hygiene</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Housekeepers, Clerks, Visitors, Environmental Services Management,	The environment should be attributing with great hygiene level.	<ul style="list-style-type: none"> <li>• High quality healthcare services</li> <li>• Safe environment</li> <li>• Low infection rate</li> <li>• Low risk</li> </ul>



	Laundry worker, Transportation worker, Maintenance worker, Waste management worker.		
<b>High and Consistent Quality of standards</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	High and Consistent Quality of standards.	<ul style="list-style-type: none"> <li>• Reputation of organization or hospital</li> <li>• Professionalism</li> <li>• Trust</li> <li>• Positive psychological bias</li> </ul>
<b>Free of Infections</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	Infections free and healthy environment.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> <li>• Quick healing</li> <li>• Positive psychological bias</li> <li>• Low risk</li> </ul>
<b>Timely Services</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The response time for any request should be very short.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Positive psychological bias</li> <li>• Reputation of hospital or organization</li> <li>• Safe environment</li> </ul>

<b>High Coordinating</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	There should be high level of coordination between hospital employees and departments.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Low risk</li> <li>• Excellent Ergonomic</li> </ul>
<b>Remove Waste</b>	Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	Wastes should be either removed or minimized.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Low infection rate</li> <li>• Low risk</li> <li>• Reputation of hospital or organization</li> <li>• Low cost</li> <li>• Timely response</li> <li>• High quality</li> </ul>
<b>Excellent Ergonomic</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The hospital environment and policy should comply with physical, organization and cognitive ergonomics.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Job accuracy</li> <li>• Excellent communication</li> <li>• Low risk</li> <li>• Reputation of hospital or organization</li> </ul>
<b>Safety</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry	Hospital environment should comply with occupational health and safety procedures.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Professionalism</li> <li>• Low risk</li> </ul>

# 7 Reference

	worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers		
<b>Appearance</b>	Housekeeping Supervisors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The appearance of the workers, supervisors and manager should induce positive biases.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> <li>• Positive psychological bias</li> </ul>
<b>Excellent Worker Attitude</b>	Housekeeping Supervisors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The environment service employee should be free from negative attitudes.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> <li>• Positive psychological bias</li> <li>• Minimum disputes</li> <li>• Less employee turn over</li> </ul>

## 7.11 Customer Context Matrix

Name of Customer	Acronym	Context of Customer	Coordination Process Area
Doctors	DOC	Direct	HIS Coordination
Patients	PAT	Direct	HIS Coordination
Nurses	NUR	Direct	HIS Coordination, Nurse Coordination
Housekeeping Supervisors	HKS	Direct	Quality Coordination, Nurse Coordination, infection control coordination
Clerks	CLR	Direct	HIS Coordination

Visitors	VIS	Indirect	HIS Coordination
Environmental Services Management	ESM	Direct	Nurse Coordination, infection control coordination
Other hospital workers	OHW	Indirect	Security coordination
Laundry worker	LDW	Direct	Nurse Coordination, HIS Coordination
Transportation worker	TRW	Direct	Quality Coordination, HIS Coordination
Maintenance worker	MAW	Direct	Quality Coordination, HIS Coordination
Waste management worker	WMW	Direct	Quality Coordination, HIS Coordination
Infection control professional	ICP	Indirect	Infection control coordination
Housekeepers	HK	Direct	HIS Coordination, Nurse Coordination

## 7.12 MSD Attributes

MSD Attribute	Description
Lifting/carrying	Large vertical movements, long carry distances.
Disability	Pose a risk to those with a health problem or a physical or learning disability.
Force	High initial forces to get the load moving.
Loaded motion	High forces to keep the load in motion.

<b>Physical ergonomics</b>	Constraints on body posture/positioning, confined spaces/narrow doorways.
<b>Posture change</b>	Strong force and awkward movement/posture. E.g. bent wrists.
<b>Excessive force</b>	Excessive force to grip raw materials, product or tools
<b>Scarceness</b>	Inadequate tools for repetitive use screwdrivers, pliers, hammers.
<b>Noise</b>	Noise which cause stress and muscle tension.
<b>Concentration</b>	Tasks require high levels of attention/concentration especially where the worker has little control over allocation of effort to the task.
<b>Floor hazards</b>	Remove slip and trip hazards through provision of appropriate floor surfaces and good keeping.
<b>Clothing</b>	Clothing/PPE may prevent sufficient movement for the task or reduce capability. E.g. to grip consider handling needs when selecting work wear/gloves.
<b>Psychosocial factors</b>	Adverse psychosocial factors can increase the potential for manual handling injuries. A workers psychosocial response to work and the workplace conditions can affect their health in general and MSDs in particular. The factors include the content, design, organization and management of the work

## Glossary / Acronyms



Terminology	Description
<b>Abstract Time Scale</b>	Time Scale that will be quantified both during operations and continuous process improvement. These time identifiers are correlated with the soft thresholds that are dynamically specified during life span of the process.
<b>BPMN</b>	<b>Business Process Modelling Notation</b> Business Process Modelling Notation is the practice of documenting an organisation's key business processes in a graphical format.
<b>Business Rules</b>	Business Rules are intended to assert business structure or to control or influence the behaviour of the Business. Business rules describe the operations, definitions and constraints that apply to an organization
<b>CRR</b>	Contract Review Rate
<b>CRRV</b>	Contract Review rate Variation.
<b>CTQ</b>	<b>Critical to Quality</b> Critical To Quality (CTQ) is continuous measuring and monitoring tool agreed between the internal processes to achieve greater customer satisfaction.
<b>COI</b>	Chain of infection
<b>Data Quality Dimensions</b>	The totality of features and characteristics of data that bears on their ability to satisfy a given purpose
<b>EBC</b>	Evidence Based Cleaning
<b>ESM</b>	Environmental services Map
<b>KPI</b>	<b>Key Performance Indicator</b> A metric that is used to help manage a process, IT service or activity. Many metrics may be measured, but only the most important of these are defined as KPIs and used to actively manage and report on the process, IT service or activity. KPIs should be selected to ensure that efficiency, effectiveness, and cost effectiveness are all managed.
<b>MSD</b>	Macro Skeleton Disorder
<b>OLA</b>	<b>Organization level Agreement</b>

	An Agreement between an IT Service Provider and another part of the same Organization
<b>Operational Policy</b>	Rules defined to operate the process.
<b>Quality Attributes</b>	Quality attributes are non-functional requirements used to evaluate the performance of a process.
<b>Risk</b>	A possible event that could cause harm or loss, or affect the ability to achieve Objectives. A risk is measured by the probability of a threat, the vulnerability of the asset to that threat, and the impact it would have if it occurred.
<b>SLA</b>	<b>Service Level Agreement</b> An Agreement between an IT Service Provider and a Customer. The SLA describes the IT Service, documents Service Level Targets, and specifies the responsibilities of the IT Service Provider and the Customer
<b>VOC</b>	<b>Voice of Customer</b>





## Appendix A: Business Process Modeling Notation Reference



APPENDIX.  
A









## INTRODUCTION

Business Process Modelling (“BPM”) is the practice of documenting an organisation’s key business processes in a manner which:




- Is highly graphical
- Focuses on business terminology rather than technical
- Allows all business steps/tasks to be included, not just those which involve a computer system

Mentioned below are the various core concepts of BPMN with the relevant definition and graphic notation.







## PROCESS START

All processes have to start somehow, general notation for a process models commence with the START event, is a circle.	
One can use simply the <i>basic unmarked</i> start event as above, or one of the different types of start event, to provide more detail as described below.	
If a process starts when some sort of message arrives, mail, email, text. Following notation can be used	<b>Message start</b> 
If a process starts by virtue of the passage of time – e.g. 1st Jan review or 4 days after the purchase order is sent, following notation can be used	<b>TIMER Start</b> 
If the process starts when a rule/condition is met – e.g. when Incident Impact is more than 100,000.	<b>RULE Start</b> 
If a process starts when another process finishes. Following notation can be used	<b>LINK Start</b> 
If there is more than one ‘trigger’ for a process to start. Following notation can be used	<b>MULTIPLE Start</b> 


## TASK AND SUB PROCESS




<b>Task</b>	Task is a lowest level activity in a process map. A task is used when the work is not broken down to a finer level of detail	
<b>Sub Process</b>	A Sub-process is a compound activity which can be broken down into finer details.	
<b>Loops</b>	Loops task or sub process continues to iterate until the loop condition is true.	

## INTERMEDIATE EVENTS



Following notation can be used to display the intermediate event, similar to start and end events.						
	<b>BASIC</b>	<b>MESSAGE</b>	<b>TIMER</b>	<b>RULE</b>	<b>LINK</b>	<b>MULTIPLE</b>
						

## PROCESS END



All processes have to end somehow, general notation for a process models end will be a circle with a solid line.	
One can use simply use the <i>basic</i> end event as above, or you can use one of the different types of end event, to provide more detail, as described below:	
If a process ends by something being sent via a message of some sort e.g., mail, email, document, following notation can be used.	MESSAGE End

	
If the end of this process causes the start of another, following notation can be used.	LINK End 
If more than one consequence of the process ending, following notation can be used.	MULTIPLE End 

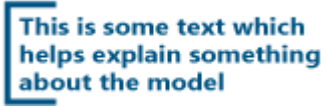


## SWIMLANES

<b>Pool</b>	A <i>Pool</i> represents a participant in a Process. It is also acts as a “swimlane” and a graphical container for partitioning a set of activities from other Pools	
<b>Lane</b>	A <i>Lane</i> is a sub-partition within a Pool and will extend the entire length of the Pool, either vertically or horizontally. Lanes are used to organize and categorize activities.	

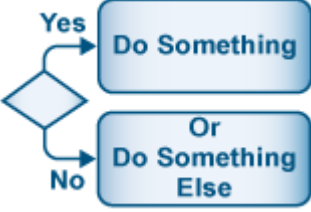
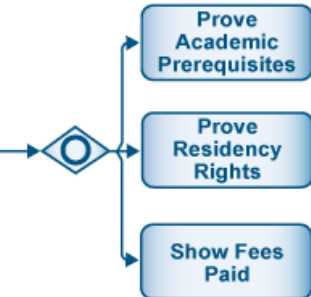

## CONNECTORS

<b>Sequence Flow</b>	A <i>Sequence Flow</i> is represented by a solid line with a solid arrowhead (see the figure to the right) and is used to show the order (the sequence) that activities will be performed in a Process.	
<b>Message Flow</b>	A <i>Message Flow</i> is represented by a dashed line with an open arrowhead (see the figure to the right) and is used to show the flow of messages between two separate Process Participants. In BPMN, two separate Pools in the Diagram will represent the two Participants.	

## ARTIFACTS

<b>Annotation</b>	The ANNOTATION shape is used to add comments to a process model. It consists of text in a square left bracket	 This is some text which helps explain something about the model
<b>Data Object</b>	A data object represents a piece of data which is required or produced by the process eg. Customer details, output.	 Application Form
<b>Group</b>	A grouping is purely for documentation or explanatory purposes. It has no impact on the model. It consists of a rectangle with dashed lines and rounded corners, usually enclosing other objects.	

## GATEWAYS

<b>Exclusive</b>	The values of the process are examined to determine which path to take	
<b>Inclusive</b>	Each branch will be evaluated and will not stop when one branch condition becomes true.	
<b>Parallel</b>	Provides a mechanism to synchronise parallel flow and to create parallel flow.	

## Appendix B: Chain of Infection



APPENDIX.  
B

# 10 Appendix B: Chain of Infection

In order to control or prevent infection it is essential to understand that transmission stages of a pathogen resulting in infection requires the six vital links (Refer to the table below).

Each link mentioned below must be present for infection or colonization to proceed, and breaking any of the links can prevent the infection.

The section below details out the six stages:

Stage	Link	Description
1	Infectious Agent	Any disease-causing microorganism (pathogen)
2	The Reservoir Host	The organism in which the infectious microbes reside
3	The Portal of Exit	Route of escape of the pathogen from the reservoir.
4	The Route of Transmission	Method by which the pathogen gets from the reservoir to the new host
5	The Portal of Entry	Route through which the pathogen enters its new host
6	The Susceptible Host	The organism that accepts the pathogen

## Link 1: Infectious Agent

The causative agent for infection is any microorganism capable of producing disease. Microorganisms responsible for infectious diseases include bacteria, viruses, rickettsiae, fungi, and protozoa. Sometimes, microorganisms are part of patient's own body flora and can cause infection in the immunocompromised host. These infections are called endogenous infections. Infections which are acquired from external sources are called exogenous infections.

## Link 2: Reservoir Host

The second link in the chain of infection is the reservoir, i.e. the environment or object in or on which a microorganism can survive and, in some cases, multiply. Inanimate objects, human beings, and animals can all serve as reservoirs, providing the essential requirements for a microorganism to survive at specific stages in its life cycle.

# 10 Appendix B: Chain of Infection

Infectious reservoirs abound in health care settings, and may include everything from patients, visitors, and staff members to furniture, medical equipment, medications, food, water, and blood.

## **Link 3: Portal of Exit**

The portal of exit is the path by which an infectious agent leaves its reservoir. Usually, this portal is the site where the microorganism grows. Common portals of exit associated with human reservoirs include the respiratory, genitourinary, and gastrointestinal tracts, the skin and mucous membranes and the placenta (transmission from mother to fetus)

## **Link 4: Route of Transmission**

The microorganism can be acquired by inhalation (through respiratory tract), ingestion (through gastrointestinal tract), inoculation (through accidental sharp injury or bites), contact (during sexual intercourse) and transplacental transmission (microbes may cross placenta from the mother to fetus). It is important to remember that some microorganisms use more than one transmission route to get from the reservoir to a new host.

Of the six links in the chain of infection, the mode of transmission is the easiest link to break and is key to control of cross-infection in hospitals.

## **Link 5: The Portal of Entry**

The portal of entry is the path by which an infectious agent invades a susceptible host. Usually, this path is the same as the portal of exit. For example, the portal of entry for tuberculosis and diphtheria is through the respiratory tract, hepatitis B and Human Immunodeficiency Virus enter through the bloodstream or body fluids and Salmonella enters through the gastrointestinal tract. In addition, each invasive device, e.g. intravenous line, creates an additional portal of entry into a patient's body thus increasing the chance of developing an infection.

## **Link 6: The Susceptible host**

The final link in the chain of infection is the susceptible host. The human body has many defense mechanisms for resisting the entry and multiplication of pathogens. When these mechanisms function normally, infection does not occur. However, in immunocompromised patients, where the body defenses are weakened, infectious agents are more likely to invade the body and cause an infectious disease. In addition, the very young and the very old are at higher risk for infection because in the very young the immune system does not fully develop until about age 6 months, while old age is associated with declining immune system function as well as with chronic diseases that weaken host defenses.