**AMC Tools&Training**

ASSET MANAGEMENT CONTROL 2020

AMC 2020 is the renewed approach to make capital goods as cost-effective as possible, seen over the entire life cycle; specify, design, implement, operate and often also including phase out. Capital assets involved are; infra structures, chemical plants, coal pits, water treatment plants, ships, planes, railway, defense systems, etc.

AMC 2020 is an integrated approach consisting of the following disciplines

OPTIMIZNG

Asset Performance Management

This includes aspects such as; standardize, record, monitor, adjust and improve.
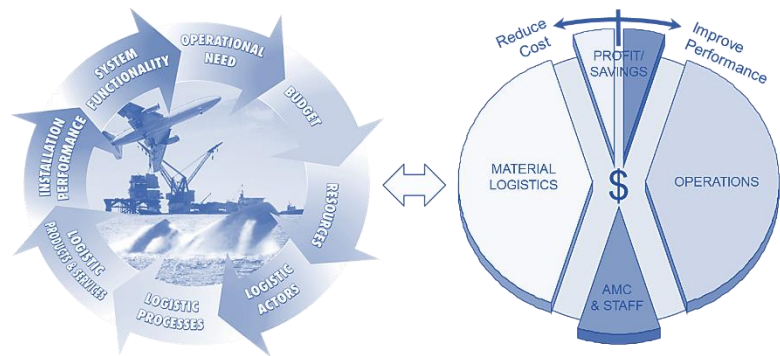
SIMULATING

Asset Life Cycle Management

This includes aspects such as: planning, budgeting, modeling, simulating and reporting, over the entire life cycle of assets.

SPECIFYING

Asset Logistics Engineering

This includes the technical aspects of asset management, such as designing and/or specifying the; documentation, configuration, testing, maintenance plans, et cetera.

Within the defense sector this is known as Integrated Logistics Support or Through Life Engineering.

AMC 2020 is compliant with the International Standard ISO 55000

With regard to the required asset management system, the international standard ISO 55000 offers a clear structure, with which the 'line of sight', or the control and management of all asset-related processes, becomes clear to everyone.

Within day-to-day business operations, the asset management function ensures that this asset-related line of sight remains up-to-date and is transparent for all involved.

In this context the Asset Management Control objective is to provide that the asset management processes are carried out by "professionals" with "reliable information".

AMC T&T supports this by providing Tools, Training and Support

Tools

In the form of; methods, techniques and web applications, tailored to your needs and situation.

DGAME

AMC-Scan

VALID
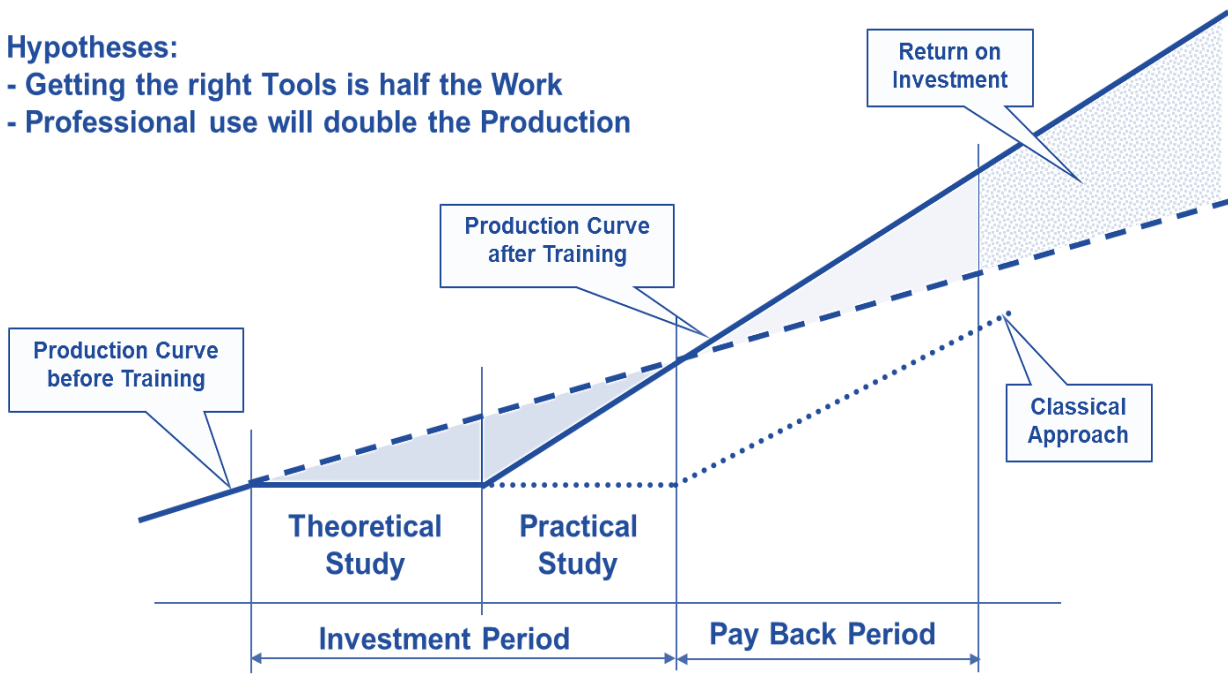
DYNAM

ORCA

ILSA

The AMC Toolbox
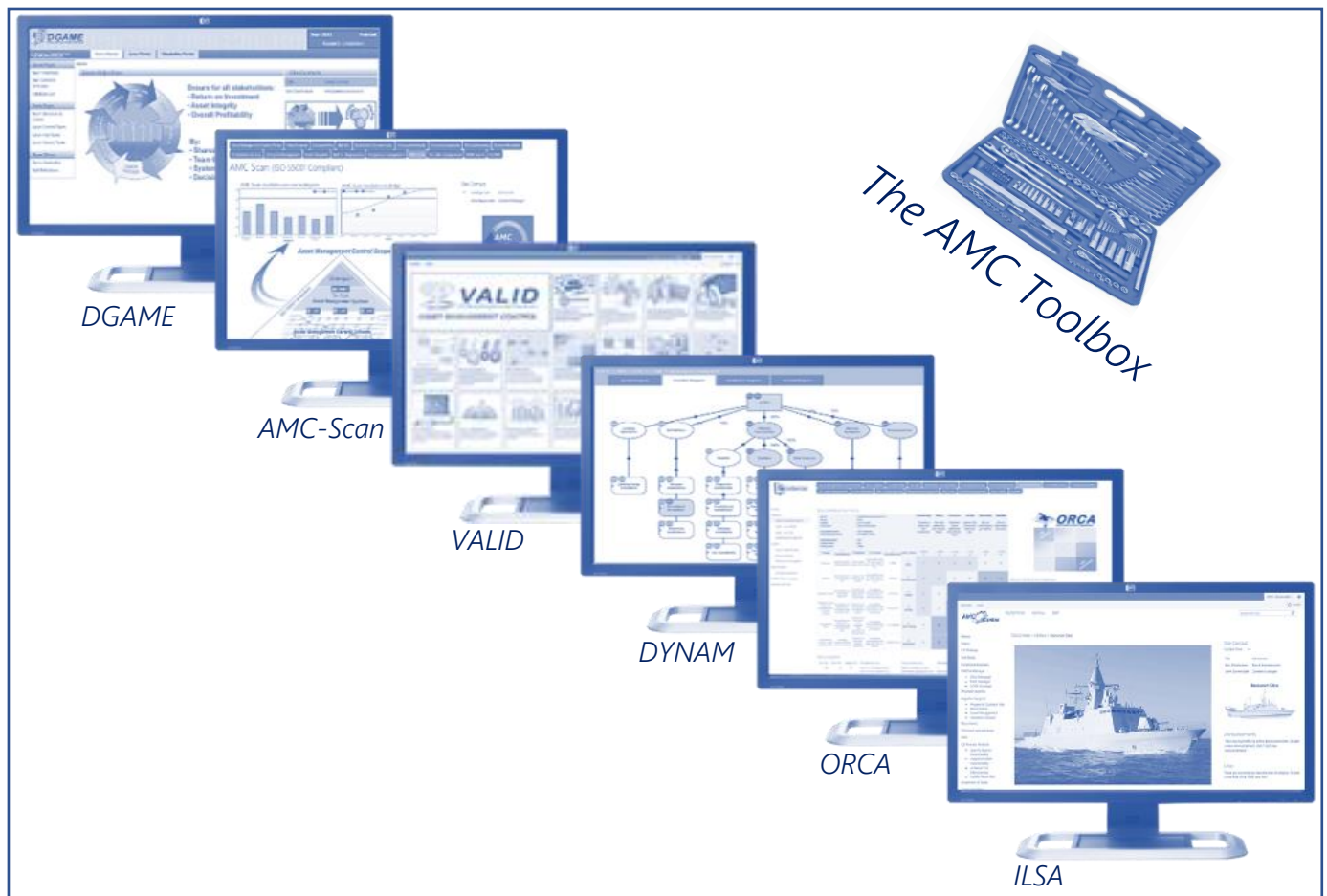
Training

To achieve the theoretical background and this in combination with training-on-the-job, customized to meet the need on the most effective way. This including post academical courses in collaboration with a universities of applied sciences.

Hypotheses:
- Getting the right Tools is half the Work
- Professional use will double the Production

Return on Investment

Production Curve after Training

Production Curve before Training

Classical Approach

Theoretical Study   **Practical Study**
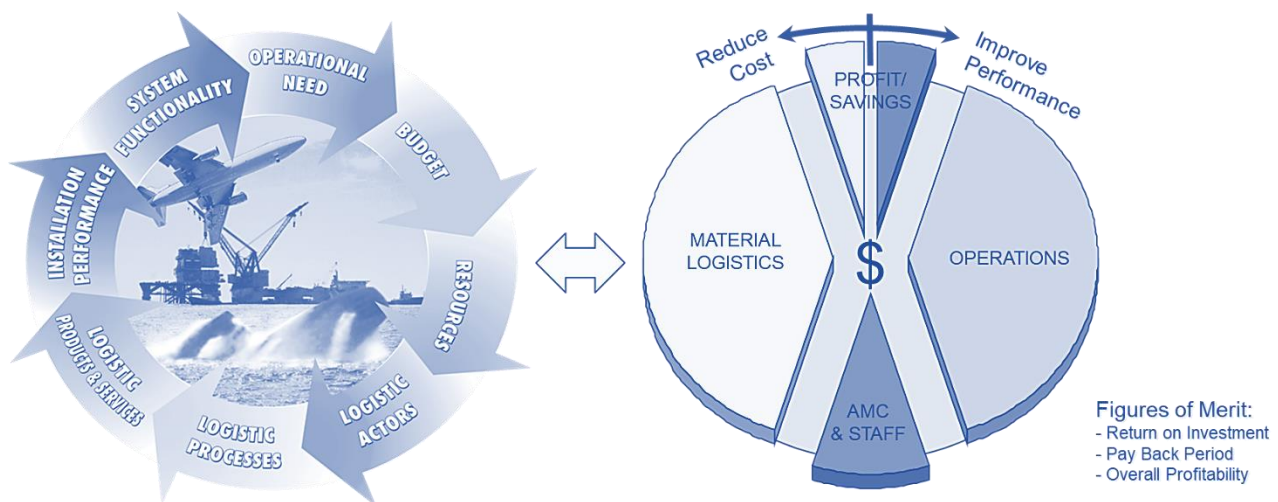
Investment Period   **Pay Back Period**

Support

This can consist of (strategic) consultancy, IT Engineering and support in both, the implementation and execution of asset management.

Asset Performance Management

OPTIMIZING

Asset Performance Management (APM) is about setting up the process chain in such a way that performance becomes measurable and that the overall asset (system) performance can be translated into performances of the individual parts/installations of the system. The reverse therefore applies also, so that the performance of the individual components/installations can be abstracted to the performance of the system/network as a whole.

Tools

DGAME stands for *Dynamic Gathering Asset Management Enhancement*

DGAME is a serious gaming platform where team interests are central, because asset management is more than just Operations & Maintenance!

Experience the opportunities and threats that arise with Operations & Maintenance (O&M) of an offshore wind farm, which can be applied in all asset management sectors!

DGAME offers a unique game environment in which participants are introduced to Asset Management Control. Participants are given the opportunity to set the course for Operations &

Maintenance in one of the most dynamic and challenging sectors where asset management is applied independently (DGAME1) or in a team setting (DGAME2). With DGAME you can; train, refresh or develop, insight and skills, in the field of asset management.

DGAME2 is a web based application that allows the game to be played in any location. During a game session, the participants (3-18 people) form the Life Cycle Management (LCM) Team. The team interest is 'key'. They jointly take up the challenge to strive for a maximum Return on Investment in such a cost-effective way.

AMC-Scan for periodic asset management audits (ISO 55001) and monitoring improvements

The AMC Scan can be performed in a daypart. It starts with a short introduction given by the "facilitator", for example an independent consultant. Then, the group of participants, usually 4 to 8 people, from different units of the organization(s) and together represent sufficient knowledge of the processes and the intended asset management system, will perform the audit, guided by the facilitator.

VALID stands for *Verified Asset Logistics Information Domain*

o   *VALID* web portals for integrated asset management and information management thanks to scalability, from single web applications to multifunctional web services
o   high level of security through daily backups and a login code per user
o   cost effective through maximum use of standard applications and browsers
o   integrated business functions such as; agenda, contact list, task- and document management
o   the safe procurement of information exchange with other parties
o   available including both technical and functional management (help desk)
o   functions can be expanded indefinitely by means of specific components
o   data exchange possible with all other information systems
o   acts as a central communication platform (the e-mail killer)
o   information screens/dashboards can be arranged to your own wishes
o   sustainable as a replacement for the hardcopy archive
o   accessible worldwide via the Internet
o   professional support.

To set up a VALID Portal it is important to coordinate a number of things in advance, such as:

Portal Sitemap: The design of the portal is coordinated and made, based on the customer requirements.

Users and Permissions: Which users need to be added and which rights do the users (groups) get within the portal.

Content and Add-ons: The content and layout of the sub-sites/info-pages; how the content is posted and tracked.

Layout and Design: The VALID Portal is based on a standard (SPP) layout, e.g. colors, logos and images. This all can be adjusted to ensure that the VALID$^+$ Portal fits in perfectly within the corporate identity of your organization.

Hosting and Support: The hosting of the portal can be arranged internally or externally, from your organization. If there is no SPP platform within the organization, it is preferable to outsource the hosting to hosting providers that are equipped for this purpose; guarantee uptime, security and backup.

System Requirements: VALID Portal is website based and can be used with any browser.

We see different roles in managing the portal:

Portal Manager: This is the portal administrator who has full access to everything. Users can be created and portals added or deleted via this administrator.

Sub-site Manager: Depending on the number of sub-sites used, more users can get this role. The site manager can make adjustments to lists and their contents. It can also be set as the owner of a user group so that users can be added to a group.

Content Manager: The Content Manager is responsible for the content placed on the portal. The intention is that the info remains up-to-date and is supplemented if necessary. The Content Manager can be held responsible for the fact that the content is incorrect, which makes it more sensitive to make the content actually accurate.
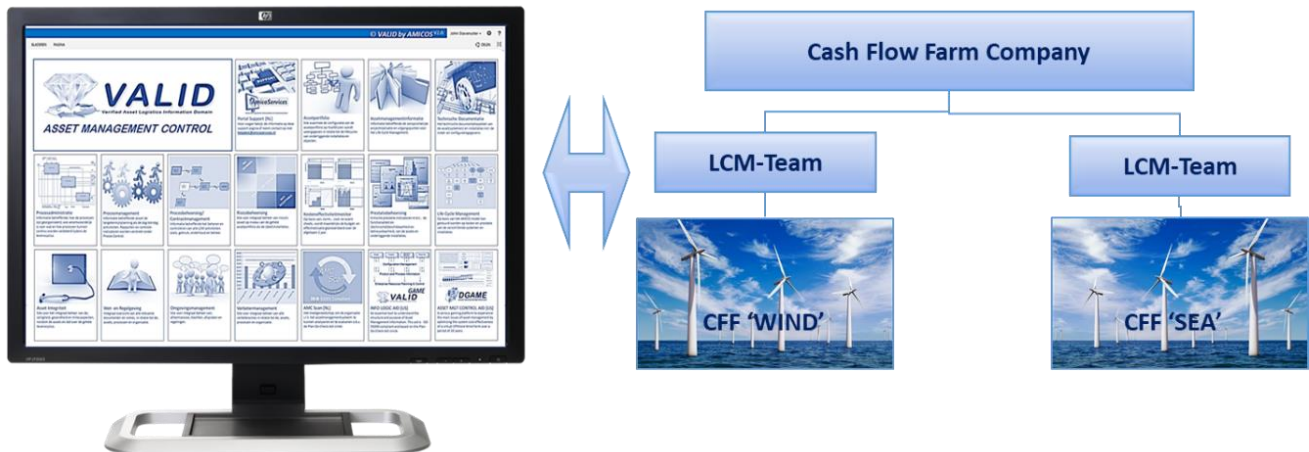

AMC Tools are web-based and based on, or integrated with, MS SharePoint Portal. The tools can be used from a secure Internet server or installed within your "own" IT environment.

AMC Training provides the effective use of the AMC Tools whereby these tools also act as an (internal) digital learning environment.

Training

Basic Asset Management Course

ISO 55000 compliant and with a digital learning environment.

This Course covers 4 days of 2 sessions as indicated below.

Cluster /Day	Session 1	Session 2
1	**Asset Management Context** 1. Asset Management introduction 2. Determination of the Asset Portfolio 3. Stakeholders requirements 4. Asset Management Policy & Strategy 5. Set-up of a SAMP and AMP	**Asset Management System** 1. From Policy to Practice by 'AM Drivers' 2. Integration of AMS with the Business Processes 3. Business Support (Information, Communication, etc.) 4. Laws & Regulations 5. AMS 'Plan' Audit
2	**Risk Management** 1. Risk Policy and - Context 2. Risk Identification 3. Risk Analysis 4. Risk Measures 5. Risk Control	**Reliability Centered Maintenance (RCM)** 1. Risk Based Maintenance 2. Set-up of Maintenance Plans 3. RCM Methods (FTA & FMECA, etc.) 4. RCM Approach 5. RCM Case
3	**Compliance Management** 1. AMC 'Grip on Performance versus Cost' 2. Plan Do Check Act Circle in Practice 3. Basis Systems Engineering 4. Monitoring & Reporting 5. Correctios en Correcting Measures	**Operations & Maintenance** (Exploitation) 1. Maintenance Strategies 2. Maintenance Plans 3. Maintenance Concepts (RCM, CBM, TPM, etc.) 4. O&M Key Performance Indicators 5. Asset Management Control Game (DGAME2)
4	**Process Management** 1. Process- versus Project Management 2. Teamwork en Competence Management 3. Organization Structure and Culture 4. Service Level Agreements 5. Information Analysis (VALID Game)	**Quality Management** 1. The Learning Organization 2. Continuous Improvement 3. Improvement Actions 'Initiate and Control' 4. AMS 'Check' Audit 5. Wrap-up & Evaluation

Actor Performance Analysis

This module is based on a practical approach to qualifying and quantifying the necessary 'actor performance' and their relationships with stakeholders, such as customers and implementers. The goal is to create a logical and effective logistical process structure.

The module starts with the elaboration of different activity diagrams (simple process models) in group sessions. The final results will be discussed in plenary sessions. With the experiences gained then, it is possible to structure a complete logistics process model that can serve as a basis during the entire life cycle of an asset.

Information Management

Asset Management Information (AMI) focuses purely on being able to improving the accessibility of all forms of "asset" information, during the entire life cycle of one or more asset (s). For complex capital materiel (assets), AMI already starts at the preliminary study phase. For example, by storing alternatives at system level that have been tested against the preliminary operational needs. This may show that the requirements must be redefined through a revision of the operational needs. For example, lifetime cost estimates are often drawn up for each alternative. Ultimately, at this stage, a large part of the principles for maintenance are already laid down at system level.

All this information is often acquired for a lot of money and can be seen as a valuable investment because it makes an essential contribution to the ultimate cost-effectiveness of the asset concerned over the entire life cycle. The AMI therefore, plays a crucial role in successful exploitation of assets, because it delivers:

- information for the intended operational use;
- information for the principles & preconditions with regard to the service lifecycle;
- the basis for implementation of operation and configuration management;
- the 'conscience' in the context of considerations that have to be made with regard to modifications or redesign.

Various forms of information management are discussed within this module in order to provide a transparent and consistent information concept. Attention is paid to the way in which new, but also existing, information can be stored in such a way that it is easy to manage and consult.

Team Management

This module is based on the assumption that 'competencies of a group of employees are many times greater than those of each individual'. To achieve this it is acknowledged that it is then necessary to recognize the qualities of each other and to know how to combine these. This module discusses how to set team targets and how to achieve them in order to achieve the overall results. For this, self-managing teams and their way of working will be discussed. The following components will be treated:

- what is a self-managing team?
- what are the benefits of self-managing teams?
- are there any disadvantages to self-managing teams?
- process-oriented organization around self-managing teams;
- basic conditions for team formation;
- monitoring and control tasks;
- development of self-steering capacity;
- performance-oriented work by self-managing teams;
- which control tasks play a role at AMC?
- management control and who performs these control tasks?

Support

Consultancy

In the context of Asset Performance Management (APM), exploratory studies have been carried out for various organizations, in particular related to the question 'how asset management (AM) can best be combined with Performance Management (PM)?'.

All stakeholders are involved by phasing this as follows:
- a business orientation with regard to AM and PM
- brainstorming in a team about a possible (improvement) approach
- work out results and include them in an improvement / implementation program
- presenting the improvement program and coordinating the follow-up approach
- development of an advisory memorandum "Follow-up pack APM".

IT Engineering

IT Engineering support can consist of:
- expanding or adjusting the user interface
- set up or redesign the data warehouse
- linking other applications / databases to one or more AMC Tool (s).

## *Implementation*

Implementation support can consist of:
- support with the (initial) realization of APM products such as; register, monitor, adjust and improve;
- performing specific activities, whether or not on a project basis.

Asset Life Cycle Management   SIMULATING

AMC T&T has invested heavily in recent years to be able to apply Life Cycle Management (LCM) in practice.

LCM 2020 is the result as a completely renewed asset management approach with the primary objective: *Optimizing the effort/costs and risk management with respect to the required performance/deployment of the asset (portfolio).*
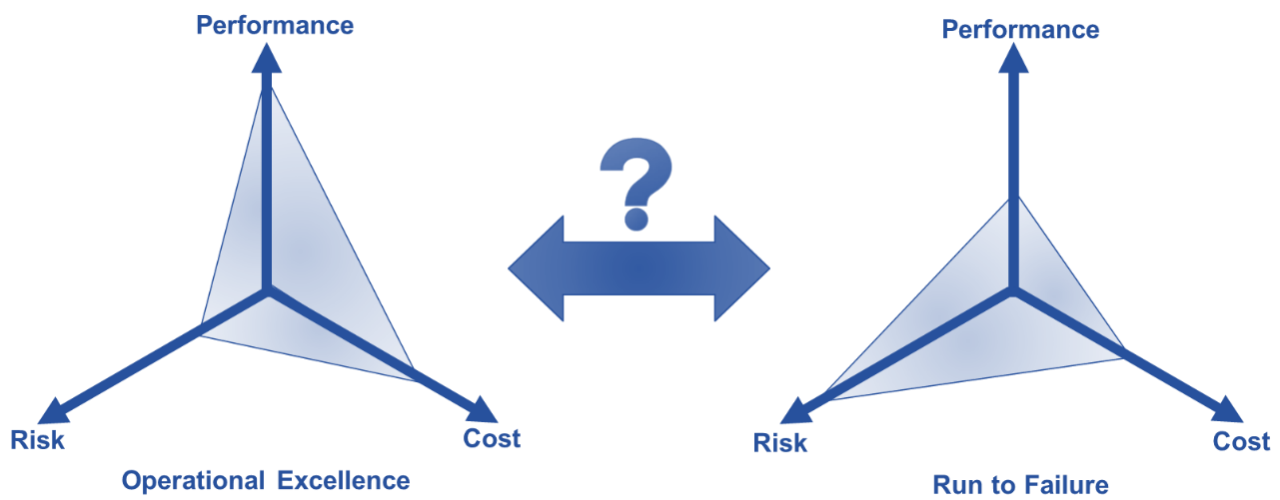
LCM 2020 Focal Points

1. Transparent information and communication platform
2. Close the PDCA circle
3. ISO 55001 compliant
4. Optimal balance between Performance, Costs and Risks
5. Focus on assets and actors throughout the entire life cycle
6. Continuous improvement
7. Supporting long-term service contracts
8. Suitable for every organization and / or contract type.

Tools

DYNAM stands for *Dynamic Asset Management*

DYNAM is a Life Cycle Simulation Tool and has been developed to modulate Life Cycle Support over the entire lifecycle of an asset, or part thereof. This in a practical and transparent manner.

The following aspects are taken into account:

- modeling/budgeting the entire life cycle or part thereof
- determining the (technical) installation characteristics
- defining of; design and maintenance classes and the quantification of associated load and maintenance factors.
- defining expected usage scenarios by filling-in associated simulation parameters
- analyzing the simulation scenarios, drawing up reports to select the best option.
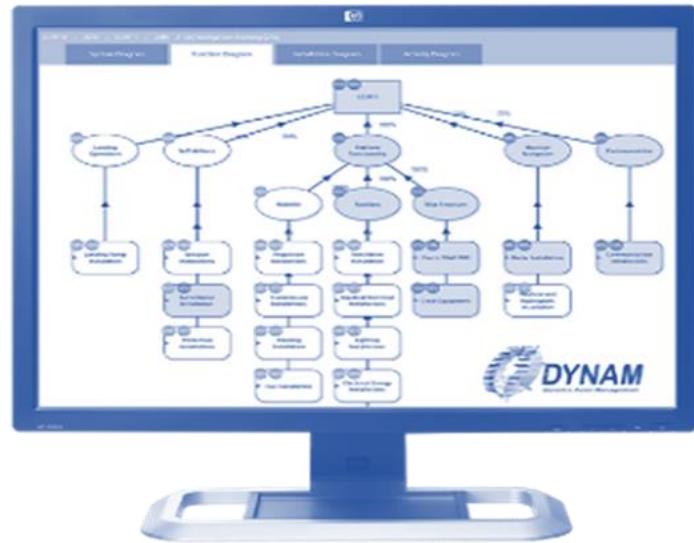
*ORCA* stands for *Overall Risk Control Application*

ORCA has been specially developed for "integral" risk management. This with the idea that every asset (portfolio), within an organizational context, is related to a specific area of responsibility. For example, the "risk appetite" of the Directorate-General for Public Works and Water Management as a whole will be different from that of a regional Waterway Management Agency. For that reason, the risk matrices in ORCA can be related to each other, starting with the "Company Value Matrix" at the highest level and below that Risk Reference Matrices down to the technical installation level.

ORCA automatically switches from organization-related risk matrices, to which a risk register and control measures can be linked, to technical installation-related risk matrices to which failure modes, maintenance strategies and -tasks can be linked.

This makes ORCA also the ideal application to use for risk-based maintenance (RCM4use).

The RCM4use approach is shown in the process diagram below, where the strategic and tactical level, as (core Maintenance Engineering), is supported by an AMC Portal and the operational level (core Supply Chain Management) by any ERP/EAM system.
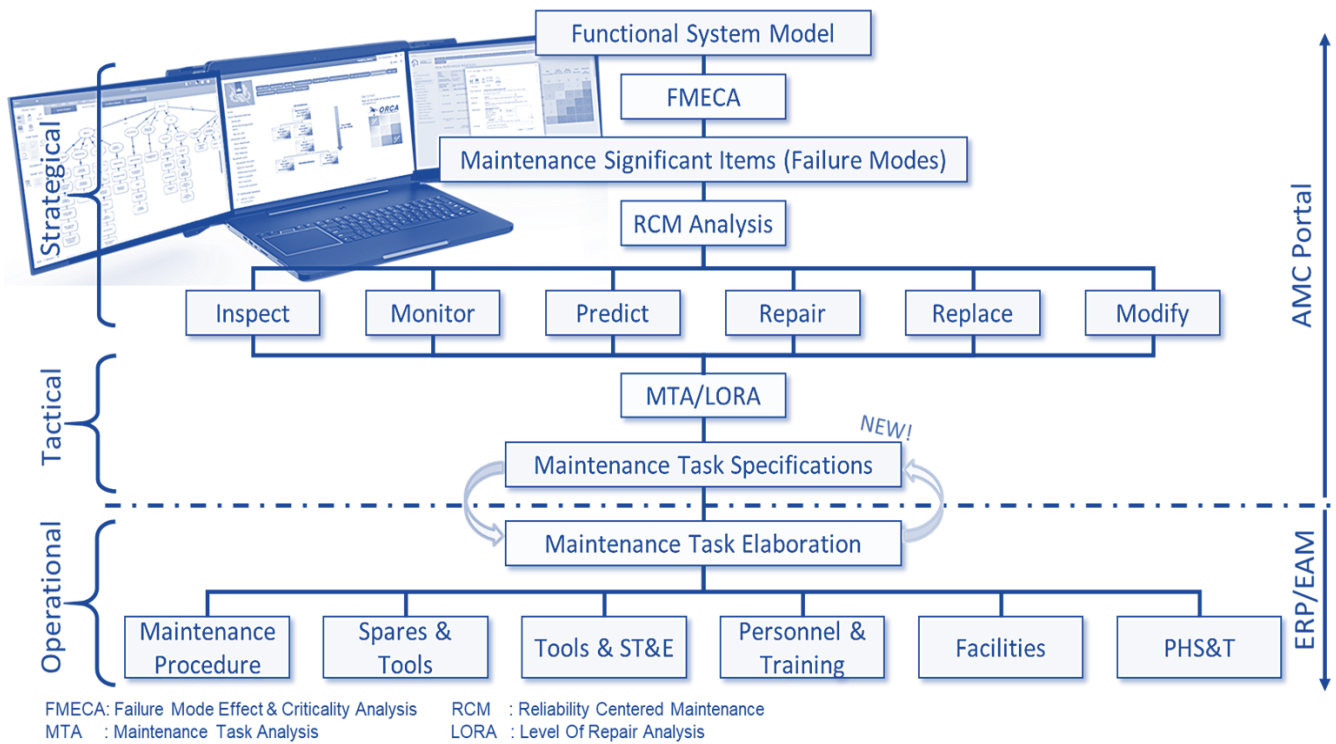
RCM4use Process Diagram.

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Training

LCM training modules provide:

LCM Need Assessment

This module deals about how the (future) need of an asset over the life cycle can be specified in an economic manner. The approach is based on so-called "systems thinking" theory. This is an approach for managing and maintaining physical objects. You become acquainted with concepts such as; system boundaries, subsystems, functions, installations, and with activities within the context of Asset Management. With this, this module is also part of Asset Logistics Engineering, as discussed later on.

Life Cycle Management

In this module, LCM is presented as a method that enables organizations to make decisions based on "System Cost-Effectiveness". The required 'system output' is made concrete in such a way that it is also possible to work on the basis of Performance Contracts, whereby the 'Customer' (Owner/Operator) can make choices, based on the (production) output to be realized. both the short and long term.

With LCM the following is aimed:
- influencing the design and realization of an asset in order to minimize the lifetime costs, in relation to RAMS SHEEP (Reliability, Availability, Maintainability, Safety, Security, Health, Environment, Economics and Politics);
- designing an optimal arrangement of the logistical support during the exploitation phase;
- being able to determine the necessary maintenance activities per maintenance level;
- being able to define, in conjunction, the necessary maintenance resources for the maintenance phase, such as; spare parts, tools, measuring and testing equipment, technical documentation, facilities, maintenance software, training and personnel;
- being able to actually provide logistical support at the lowest possible total costs;
- the timely detection of obsolescence / technical obsolescence of system parts and / or components, in order to tackle related problems;
- develop alternatives based on so-called "real options" to support decision-making by (higher) management.

Life Cycle Simulation

This module supports the LCM module and specifically addresses the following questions:

- Which scenarios can be expected?
- What requirements are set for the asset (system)?
- What requirements can (logically) be made of the asset (system)?
- What can we expect in terms of results / system (eco)cost-effectiveness?

This module / workshop takes 1 to 3 days and offers advanced knowledge of system modeling and how to apply this in practice.

User skills are obtained by working out various real-life cases in the digital learning environment of DYNAM.

An Asset Management Control Game environment (DGAME) is available to experience the usefulness of Life Cycle Simulation in practice.

Support

For example, specifying a Sustainable Asset Management Information System (DAMIS) for incinerators where, in addition to monitoring and adjusting cost-effectiveness, the aim is also to control/minimize the "eco costs". The eco costs indicate the impact of the use and maintenance of an asset on the Earth's ecosystem.

For this, a complete management package has been developed including the maintenance cycle. The focus is on moving from simulation to LCM monitoring and control.

The basis for this development is the Asset Management System (AMS), as described within the ISO 55000.
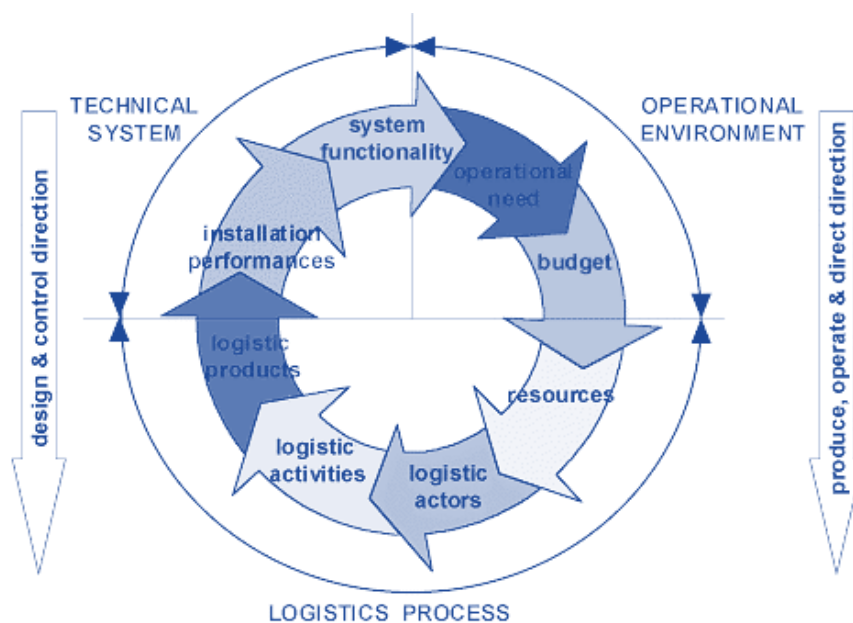
Asset Logistics Engineering SPECIFYING

Asset Logistics Engineering is the field in which disciplines such as *Systems Engineering, Design to Maintain and Logistics Support Analysis*, are applied. To implement this in a structured manner, a specific System Analysis Approach has been developed within AMC, for gaining qualitative insight during the (planned) lifecycle. For this, the asset (system) and the logistic processes are represented as an integrated Logistics Process Cycle (LPC). To specify the qualitative and quantitative Asset Logistics Engineering information needed, an analysis is made for the various life phases.

Experience has shown that this approach prevents people from having to start with a set of unstructured specifications and documents, (fortunately) obtained from the realization phase at the start of the operating phase.
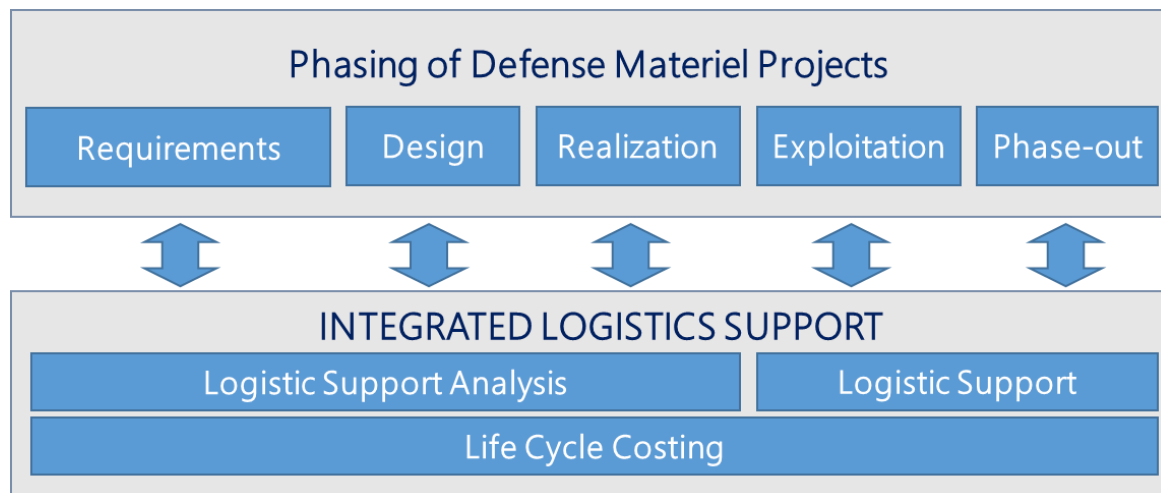
The analysis according to the LPC requires continuous monitoring to steer and coordinate all actors involved. When the life cycle of an asset (system) is worked out, from concept to phase-out, the LPC runs in two ways.

Integrated Logistics Support versus Asset Logistics Engineering

Within the defense sector, the Integrated Logistics Support (ILS) method is used for Asset Logistics Engineering. From 1950 onwards, it helps organizations to think in a structured way about providing the required military capability at minimal costs.

Therefore, the primary objective of ILS is to make the Life Cycle Costs (LCC) of defense equipment manageable, while meeting the requirements set for the equipment throughout the entire lifespan. The requirements set for defense equipment include requirements with regard to the required availability and reliability. By applying ILS, the logistic support of equipment (maintenance, replenishment, training, procedures, etc.) is approached and attuned to this, in a structured way for the entire lifespan.

Phasing of Defense Materiel Projects

| Requirements | Design | Realization | Exploitation | Phase-out |

INTEGRATED LOGISTICS SUPPORT

| Logistic Support Analysis | Logistic Support |

Life Cycle Costing

ILS covers all life phases of Defense Systems [ILS Platform Navy Maintenance Establishment, 1999]

Tools

ILSA stands for *Integrated Logistics Support Application*

Integrated Logistics Support is the NATO approach for Asset Logistics Engineering of Defense Systems, seen as capital assets. For example, a maintenance preparation manager is appointed for a new navy ship class to ensure that Asset Logistics Engineering products such as; specifications, diagrams, drawings and procedures, not only make the construction possible but also the subsequent maintenance and that throughout the entire life cycle of this ship class.
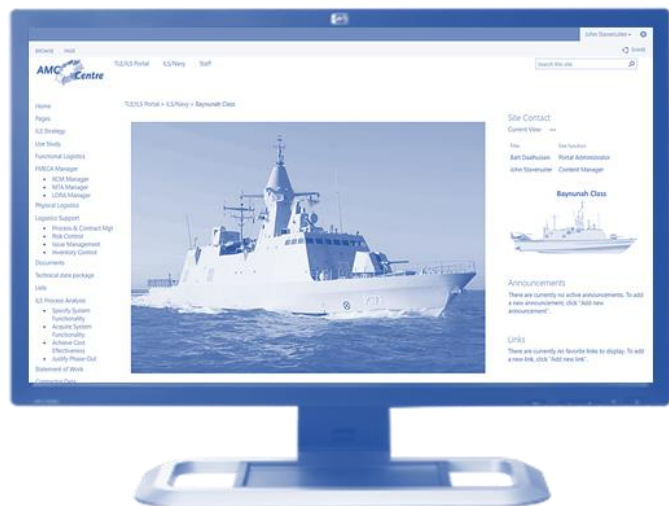
Asset Logistics Engineering or ILS, usually starts with determining the ILS strategy based on a "Use Study" and ends with a total package of construction, use and maintenance specifications.
To make these available and maintain them in a structured manner, ILSA acts as a digital filing cabinet, which can also be adjusted to your own insight and wishes. In addition, various analysis tools are available such as the; FMECA, RCM, MTA and LORA Manager. This is based on ORCA as described above on page 12 (RCM4use).

FMECA: Failure Mode Effect & Criticality Analysis
RCM   : Reliability Centered Maintenance
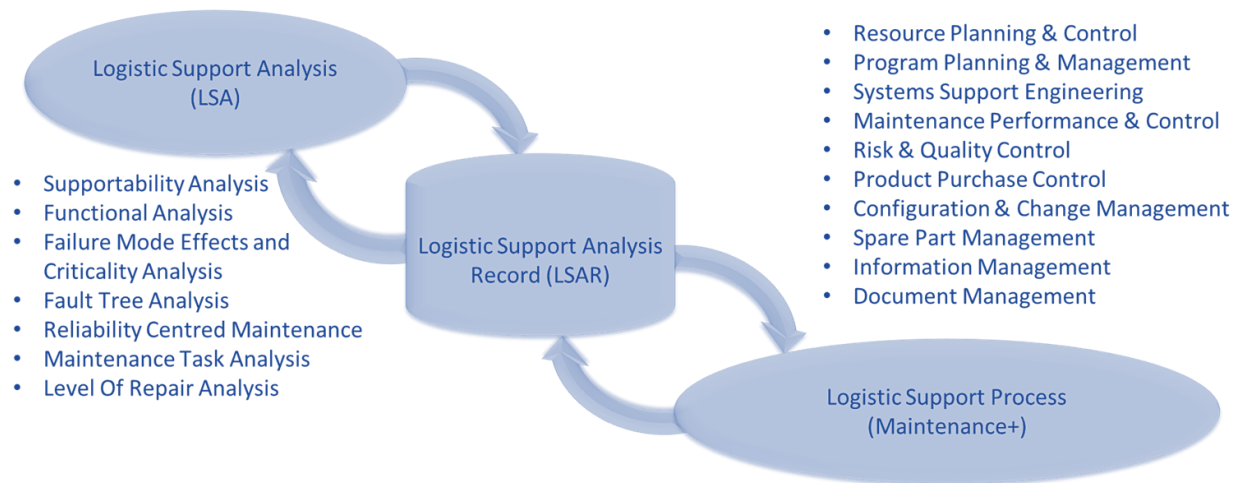MTA   : Maintenance Task Analysis
LORA   : Level Of Repair Analysis.

Training

Asset Logistics Engineering contains disciplines such as; specify, test, maintain, analyze and modify.
For the defense sector we have worked this out in a so-called Integrated Logistics Support (ILS) approach.
Depending on the duration and desired depth, the following topics are discussed to a greater or lesser extent.

ILS Main Topics, Methods & Techniques

Logistic Support Analysis (LSA)

- Supportability Analysis
- Functional Analysis
- Failure Mode Effects and Criticality Analysis
- Fault Tree Analysis
- Reliability Centred Maintenance
- Maintenance Task Analysis
- Level Of Repair Analysis

Logistic Support Analysis Record (LSAR)

- Resource Planning & Control
- Program Planning & Management
- Systems Support Engineering
- Maintenance Performance & Control
- Risk & Quality Control
- Product Purchase Control
- Configuration & Change Management
- Spare Part Management
- Information Management
- Document Management

Logistic Support Process (Maintenance+)

Support

For example, advice on how to minimize risks by going through a structured Asset Logistics Engineering process.

Contact

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AMC Centre
Knowledge & Project Partner

Asset Management Control: the PAYBACK STAGE of Asset Management!