Maritime SHS : Academic Track, Content , Delivery and Assessment

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13th National Convention

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The Heritage Hotel Manila Roxas Blvd Cor Edsa Pasy

AMOSUP - PTGWO - ITF

Outline

1) 3 issues on SHS Maritime

- K to 12 Implementation (MAAP contributions : INM Korea partnership and Proposed Curriculum

*OBE Implementation

*PQF Implementation / Academic Strands

2.) Template Sample of Content Delivery and Assessment based on STCW as amended

3.) Assessment Methodologies

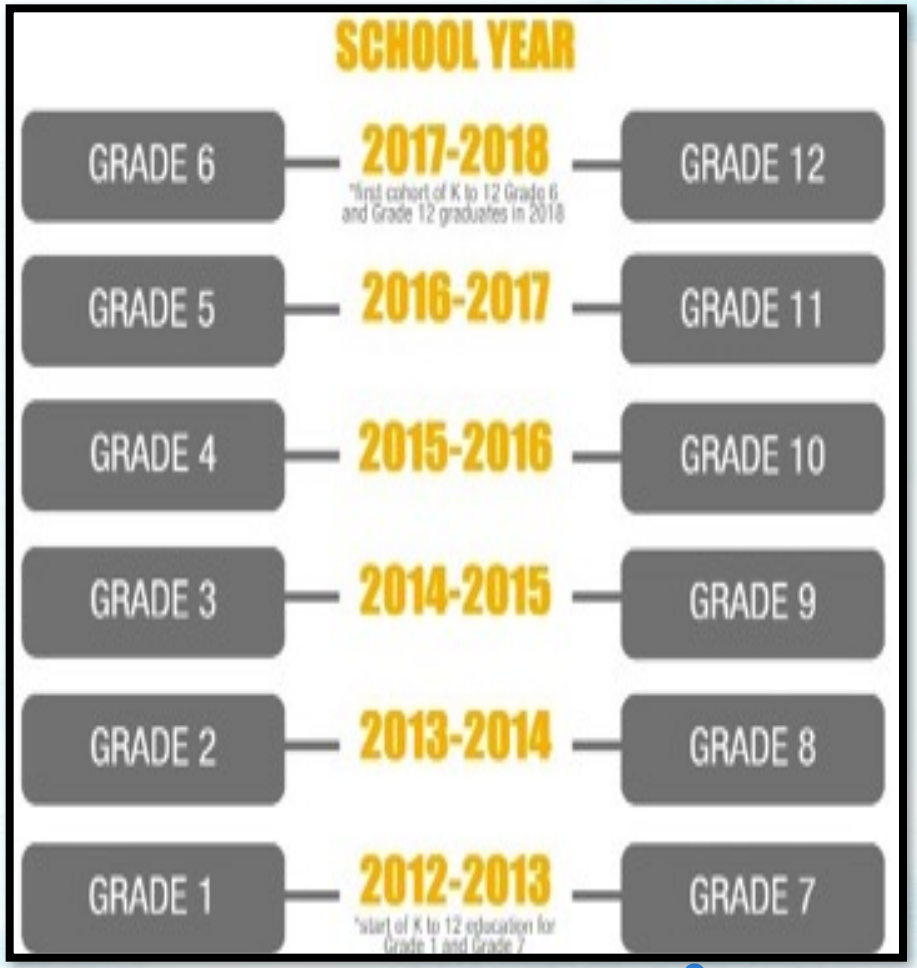
4.)Conceptual Map Frameworks

- Conceptual Map for Learning Assessment
- Conceptual Map for Learning Outcomes Based Assessment

. Implementation of K-to-12 Program

- The K to 12 has been formally launched by President S. B. Aquino III on April 24, 2012
- The K to 12 curriculums for Grade 1 and Grade 7 implemented in SY 2012-2013 and to progress annually at one grade level at a time
- First batch of K to 12 graduates will be from the Sr. HS students in SY 2017-2018

K-to-12 curriculum is integrative, inquiry based, constructivist; decongested that allows for mastery; learner-centered for optimum development of every learner and responsive to local needs



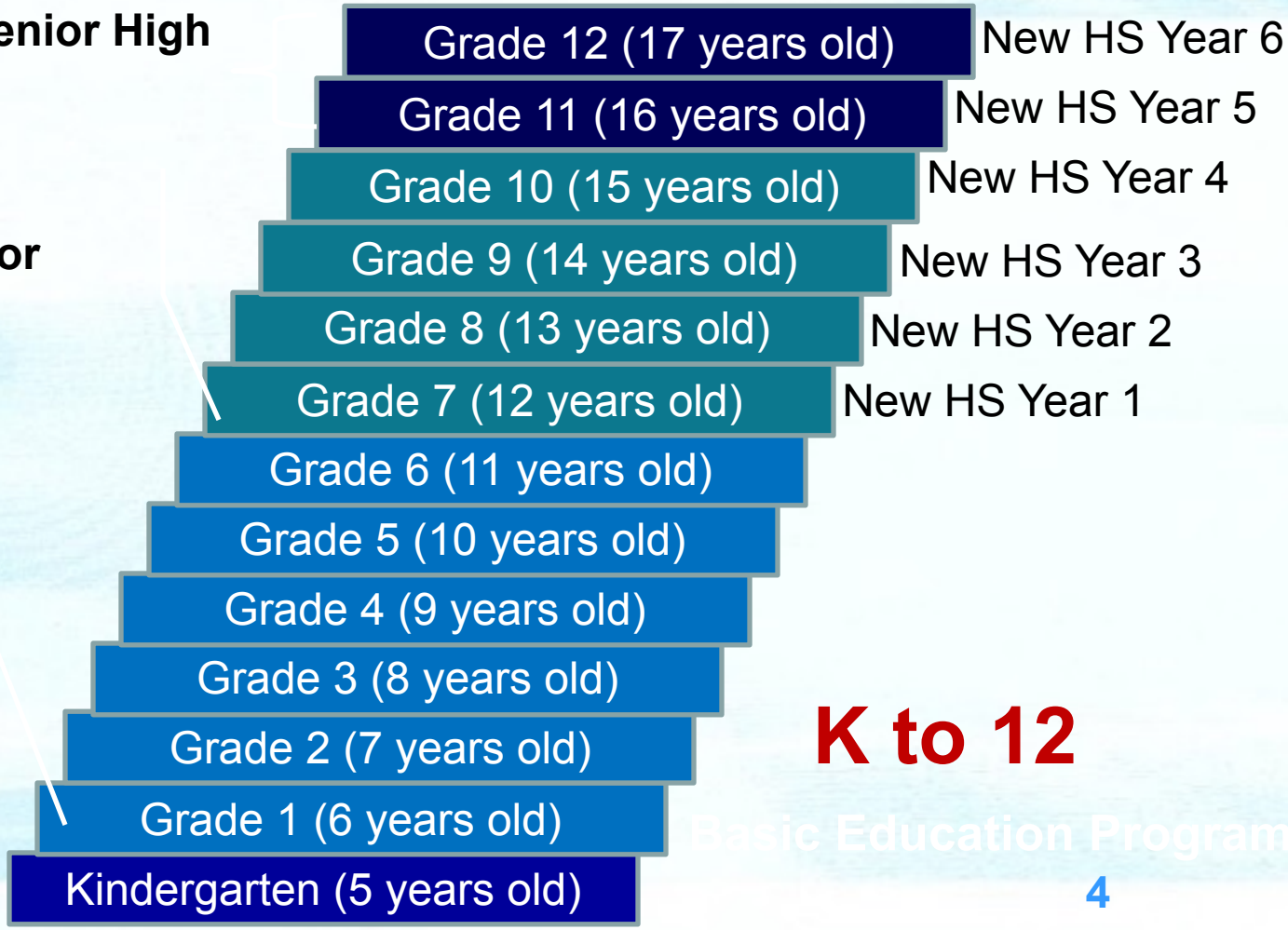
1.) K-to-12 Program Implementation

2 years of Senior High School

4 years of Junior High School

6 years of Elementary

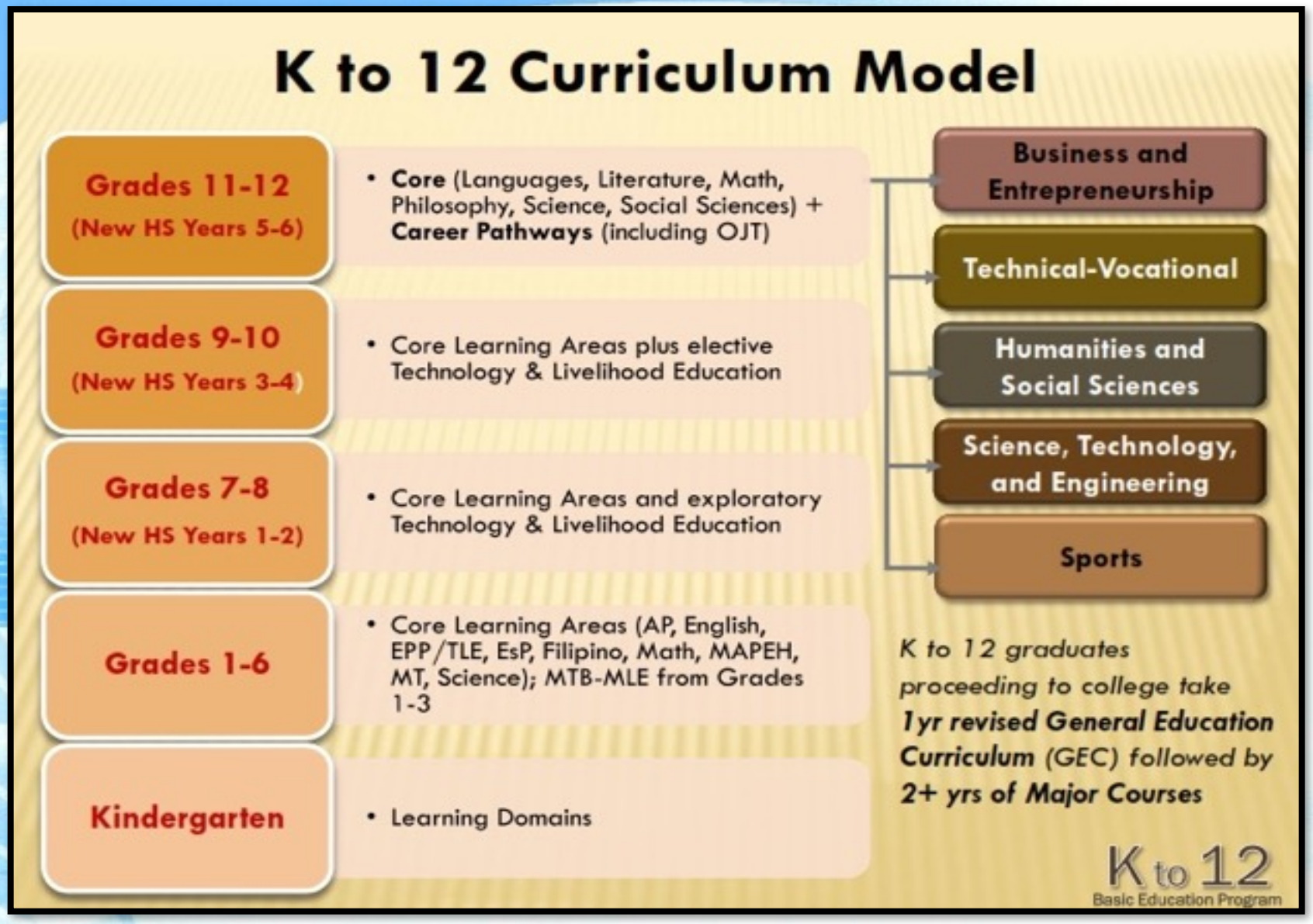
Kindergarten



K to 12

Basic Education Program

K-to-12 Program Implementation



Background/Rational of MAAP and INM Partnership

- **December 21, 2012,** MAAP submission of 24-page proposed project : "*Volunteer International Model Senior High School (INM Korea) beyond the projected nationwide implementation of the SHS in 2016-2017*", product of email communication with INM (Ms Song), DepEd, TESDA & CHED.
- **January 3-4, 2013**, meeting with INM officials
- **January14, 2013,** Confirmation letter from DepEd for MAAP to model the SHS Program in partnership with INM Korea
- **March 1, 2013**, MOA Signing between MAAP & INM (CHED, DepEd / TESDA

- **June 25, 2013** Arrival of MAAP Scholars at INM Korea
- **Jan - Feb 6, 2014** BST Training AT MAAP for seamen's book
- Visited the INM Students in **Korea 2x** on **Sept 7-10,2013** after AMFUF trip in Russia and on **October 2014** after TREEDC *Trip* in Tennessee USA to monitor the project
- **Jan 2015 –** Arrive in the Philippines , 5 out of 6 reported to MAAP for IOP in April 2015
- **June 2015 –** Submitted SHS maritime curriculum to DEPED

March 1,2013, MOU Signing bet MAAP and INM Korea witnessed by CHED , DEPED and TESDA

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MARINA and DEPED MOA Signing March 8, 2016 for offering of maritime program in SHS

Phil to remain as manning capital of the world

5,927 public schools and 4,761private high schools

http://www.deped.gov.ph/press-releases/deped-marina-tie-offer-maritime-program-shs

Photo shows MARINA, ANGKLA Rep, DEPED Sec and MAAP President

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STEM Strand

http://www.deped.gov.ph/k-to-12/curriculum-guides/Academic-Track

- **Pre-Calculus**
- **Basic Calculus**
- **General Biology 1**
- **General Biology 2**
- **General Physics 1**
- **General Physics 2**
- **General Chemistry 1 and 2**
- **Work Immersion/Research/Career Advocacy/ Culminating Activity**

Pre-Bacalaureate Maritime

http://www.deped.gov.ph/k-to-12/curriculum-guides/Academic-Track

- Pre-Calculus
- Basic Calculus
- General Physics 1
- General Physics 2
- General Chemistry 1
- Introduction to Maritime Career
- Introduction to Maritime Safety
- Introduction to Marine Transportation and Engineering
- Work Immersion/Research/Career Advocacy/Culminating Activity

2.) . Implementation of Outcomes-Based Learning (OBL) (CHED Typology)

- Outcomes Based education (OBE) - "*comprehensive approach to organizing & operating an education system that is focused in and defined by the successful demonstrations of learning sought from each student"* (Spady, 1994)
- Outcomes are actions/performances that embody & reflect learner competence in using content, information, ideas and tools successfully.
- Implementation of OBE covers all levels of education with different objectives, from kindergarten to university education, from formal to continuing and community education

Institution VMGO

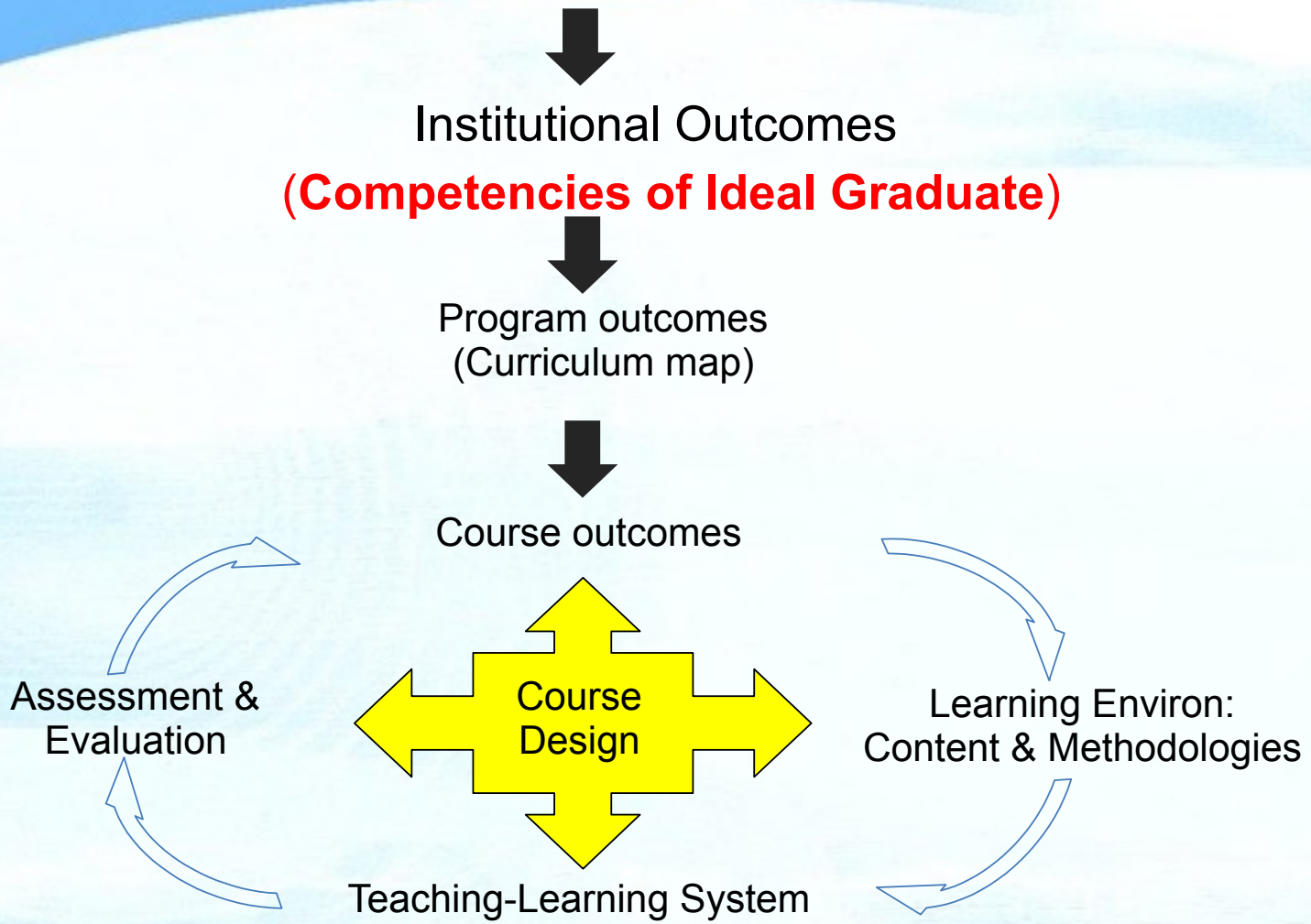
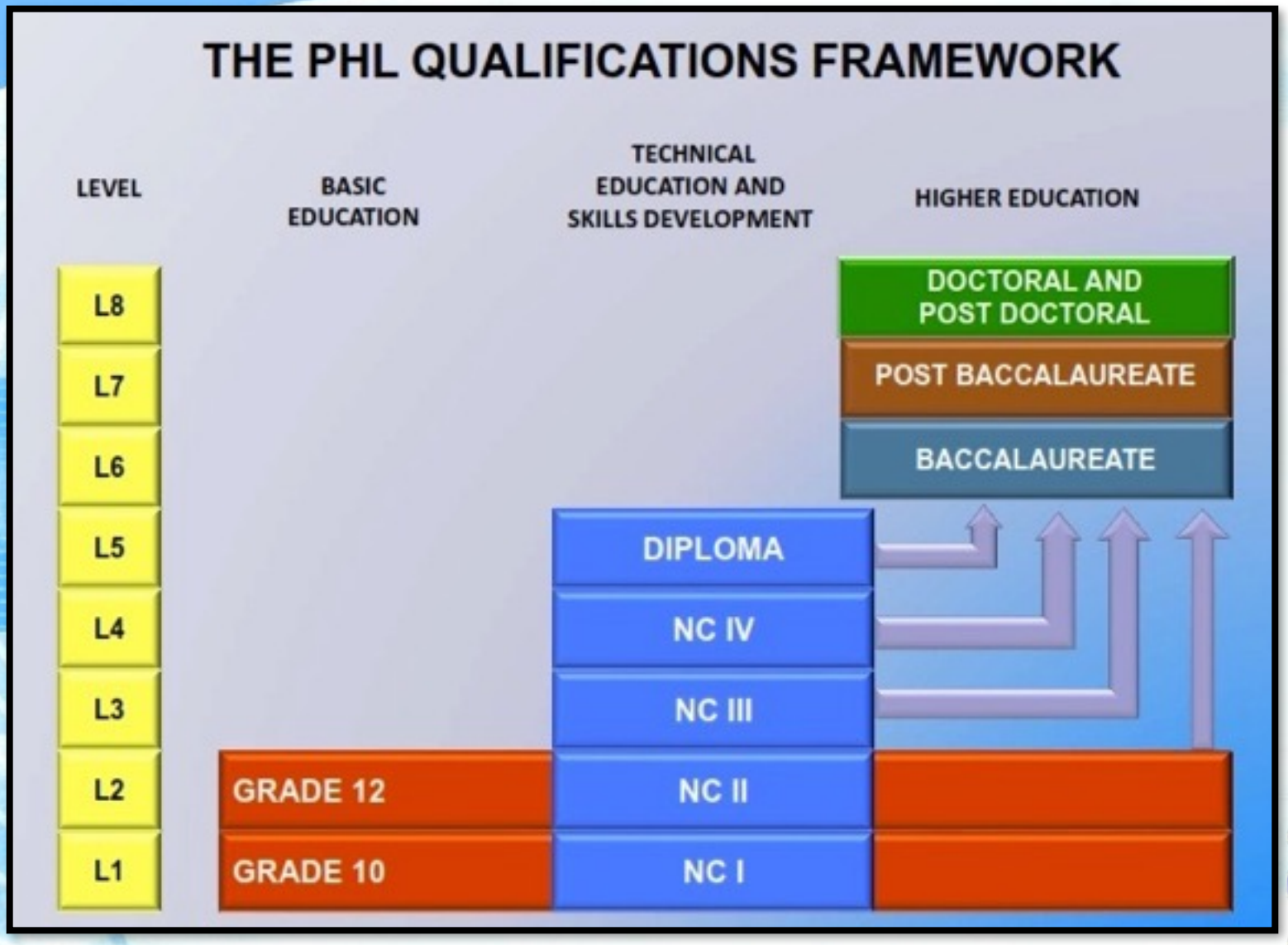


Figure 1 . CHED Framework for Outcomes Based Education

3). Implementation of Philippine Qualification Framework

- Qualification pertains to the package of competencies describing a particular function or job role existing in an economic sector
- PQF is a national policy which describes the levels of educational qualifications and sets the standards for qualification outcomes
- PQF is competency-based/outcomes-based; labor market driven and assessment-based qualification recognition
- PQF supports the development & maintenance of pathways and equivalencies which provide access to qualifications and assist people to move easily and readily between the different E & T sectors & between these sectors & the labor market & to align the PQF with international qualifications framework

Philippine Qualification Framework (PQF) Implementation (8 LEVELS)



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PQF Implementation
(Slides 20-29)

Level 1 National Certification I

KNOWLEDGE, SKILLS & VALUES	APPLICATION	DEGREE OF INDEPENDENCE
Knowledge and skills that are manual or concrete or practical and/or operational in focus	Applied in Activities that are set in a limited range of highly familiar and predictable contexts; involve straightforward; routine issues which are addressed by following set rules, guidelines & procedures	In conditions where there is very close support, supervision and guidance; minimum judgment or discretion is needed

PQF Implementation

Level 2 National Certification II

KNOWLEDGE, SKILLS & VALUES	APPLICATION	DEGREE OF INDEPENDENCE
Knowledge and skills those are manual, practical and/or operational in focus with a variety of options.	Applied in activities that are set in a range of familiar & predictable contexts; involve routine issues which are identified & addressed by selecting from and following a number of set rules, guidelines or procedures.	In conditions where there is substantial support, guidance or supervision; limited judgment or discretion is needed.

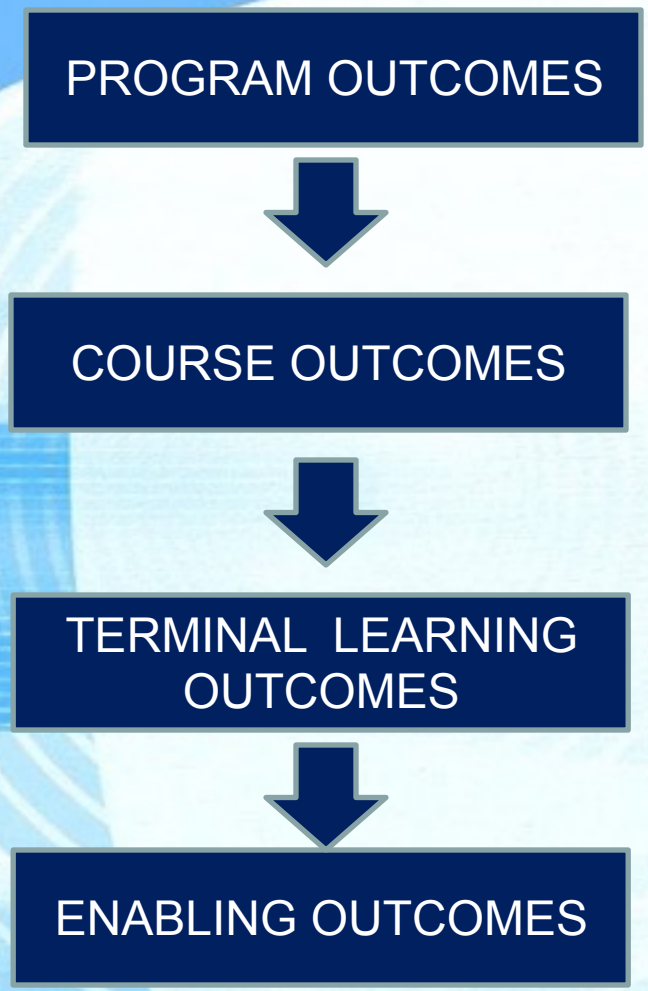
Rationale for the SHS Maritime Content Delivery and Assessment

- Philippines is in the spotlight of the international maritime community in view of the adverse EMSA audit findings regarding the country's compliance with the requirements of the STCW Convention
- Gap between overall standard of seafarers output by colleges, and the competency required by employers and desired by society (Fisher Report 2013)
  - Raise the overall standard of training for seafarers to international best practice standards
  - Adoption of Outcomes Based Education (OBE) and Competency Based Education and Training

OUTCOMES BASED EDUCATION

- **OBE** is a curriculum that is focused in performance and competency that are needed to be performed or demonstrated by the students/trainees at the end of the program
- **OUTCOMES OF EDUCATION**
  - Immediate outcomes – competencies/skills upon completion of a subject/program
  - Deferred Outcomes – competencies/skills applied at work
- The attainment of program outcomes is determined by **Outcomes-Based Assessment (OBA)**
  - Use of criterion-based standards
  - Use of multiple indicators of quality

OUTCOMES BASED EDUCATION



e.g. outcomes of BSMT, BSMarE

e.g. Seamanship1, Nav1, Nav2, Engineering Watch1, Thermo

e.g. specific topics

specific steps per topic

COMPETENCY-BASED TRAINING AND ASSESSMENT (CBETA)

- **COMPETENCY BASED TRAINING** – provides learners with the skills, knowledge and understanding to demonstrate competence against standards and performance criteria in an applied context

- **COMPETENCY BASED ASSESSMENT** – process of collecting evidence and making judgements about whether competency has been achieved

OBE and CBETA

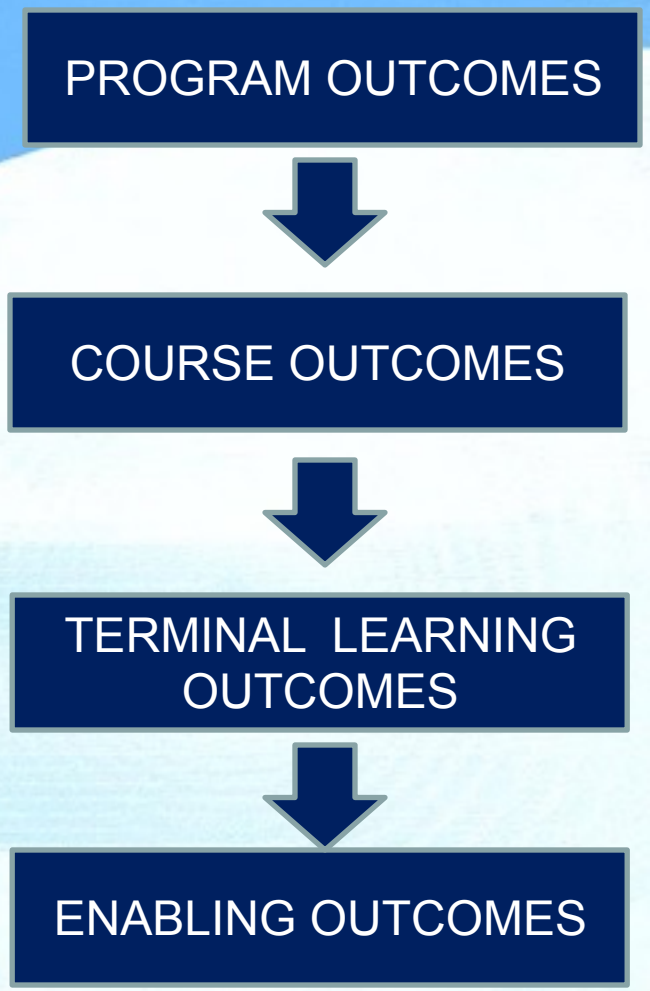
FEATURES OF OBE & CBETA

- Needs-driven
- Outcomes-driven
- Designed-down approach
- Specifies outcomes and level of outcomes
- Focus shifts from teaching to learning
- Framework is holistic in its outcomes focus

COMPONENTS OF CBETA

- Explicit learning outcomes with respect to the required skills and concomitant proficiency (standards for assessment)
- flexible timeframe to master skills
- variety of instructional activities to facilitate learning
- Criterion-referenced testing of the required out comes
- Certification based on demonstrated learning outcomes
- Adaptable programs to ensure optimum learner guidance

OUTCOMES BASED EDUCATION



- **CBETA** are the competencies that are needed to be performed or demonstrated by the students or trainees at the end of the course

Both OBE and CBETA are based on standards such as STCW and local and institutional standards

COMPETENCY BASED TRAINING & ASSESSMENT (CBETA)

COMPETENCE	KUP	TOPIC	PERFORMANCE	TLA	ASSESSMENT	TIME (hrs)
Plan and conduct a passage & determine position	Terrestrial and coastal navigation	1. Compass errors 1.1 magnetic compass	✓explain the meaning of the terms: a. intensity of magnetization b. Permeability c. magnetic susceptibility (no mathematical formula required) ✓ describe the magnetic field of earth ✓Define 'magnetic poles' and magnetic equator' ✓Define 'angle of dip' ✓Explain why it is a slowly changing quantity ✓Define 'deviation' and states how it is named ✓Explain …	1. Lectures and contingency lectures will be used to provide students with knowledge of principles magnetic compass and earth's magnetism, compass errors, principles of Gyro compass, position fixing, charts works and chart corrections, tides calculations, sailing and voyage/ passage planning	1. Problem solving: Students are expected to solve and illustrate as required practical problems regarding compass errors, tides, and sailing. 2. Practical exams will be used to test the students' ability to plot a position, calculate set/drift and UKC/OHC, compute problems using appropriate type of sailing, create and conduct a safe passage plan	1

Qualification or Function:

Navigation at the Operational Level as defined in **STCW** Table **A-II/1-***Specifications of minimum standard of competence for officers in charge of a navigational watch on ships of 500 gross tonnage or more* and Navigation at the Management Level as defined in **STCW** Table **A-11/2-** Specification of Minimum Standard of Competence for Masters and Chief mates of 500 GRT or more and **STCW** Table **A – II/4** Specification of Minimum Standard of Competence for Ratings forming part of a Navigational Watch .

For the Navigation at the Operational and Management level (STCW) , batch 1 AMEA of Global MET 2015 has jointly identified the competency skill sets to be proposed as an example for a certain course (subject) being offered in a maritime curriculum

The Navigation at the Operational level comprises 11 competency units as follows:

- **PMTP F1O-001 Plan And conduct a passage and determine position**
- PMTP F1O-002 Maintain a safe Navigational watch
- PMTP F1O-003 Use of Radar and ARPA to maintain safety of Navigation
- PMTP F1O -005 Use of ECDIS to maintain safety of Navigation
- PTMP F1O-006 Respond to emergencies
- PTMP F1O-007 Respond to distress signal at sea
- PTMP F1O-009 Use the IMO Standard Marine Communication Phrases and use English in written and oral form
- PTMP F1O-010 Transmit and receive information by visual signaling
- PTMP F1O-011 Maneuver the ship

Whereas , management Level (F1M) comprises 11 competency units, as follows

- **PMTP F1M-001 Plan a voyage and conduct navigation**
- **PMTP F1M-002 Determine position and the accuracy of resultant position fix by any means**
- **PMTP F1M-003 Determine and allow for compass errors**
- PMTP F1M-004 Coordinate search and rescue operations
- PMTP F1M -005 Establish watch keeping arrangements and procedures
- PTMP F1M-006 Maintain safe Navigation through the use of information from navigation equipment and systems to assist command decision making
- PTMP F1M-007 Maintain the safety of Navigation through the use of ECDIS and associated navigation systems to assist command decision making
- PTMP F1M-008 Forecast weather and oceanographic conditions
- PTMP F1M-009 Respond to Navigational Emergencies
- PTMP F1M-010Maneuver and handle a ship in all conditions
- PTMP F1M-011 Operate remote controls of propulsion plant and engineering systems and services

The navigation at the Support level has 4 competencies

- PTMP F1S-001 – Steer the Ship and also comply with helm orders in the English language
- PTMP F1S-002- Keep a proper look-out by sight and hearing
- PTMP F1S-003- Contribute to monitoring and controlling a safe watch
- PTMP F1S-004 – Operate emergency equipment and apply emergency procedures

Due to time constraints, GlobalMET team participants have

- identified at **least one course as sample**
- **Developed a template** that will show that a **series of competencies** are being addressed
- * familiarized with each competency unit before the assessment tool is used .One should
- ensure that they are also aware about the MARINA licensing and regulatory requirements, which may be or maybe not applicable per competency unit.
- agreed in coming up with a Code for the Qualification and code for each unit of Competencies where F stands for Function 1 is the number of unit of competency per function and O and M pertains to the level as to Operational and Management level respectively.

We are also guided by CHED Typology

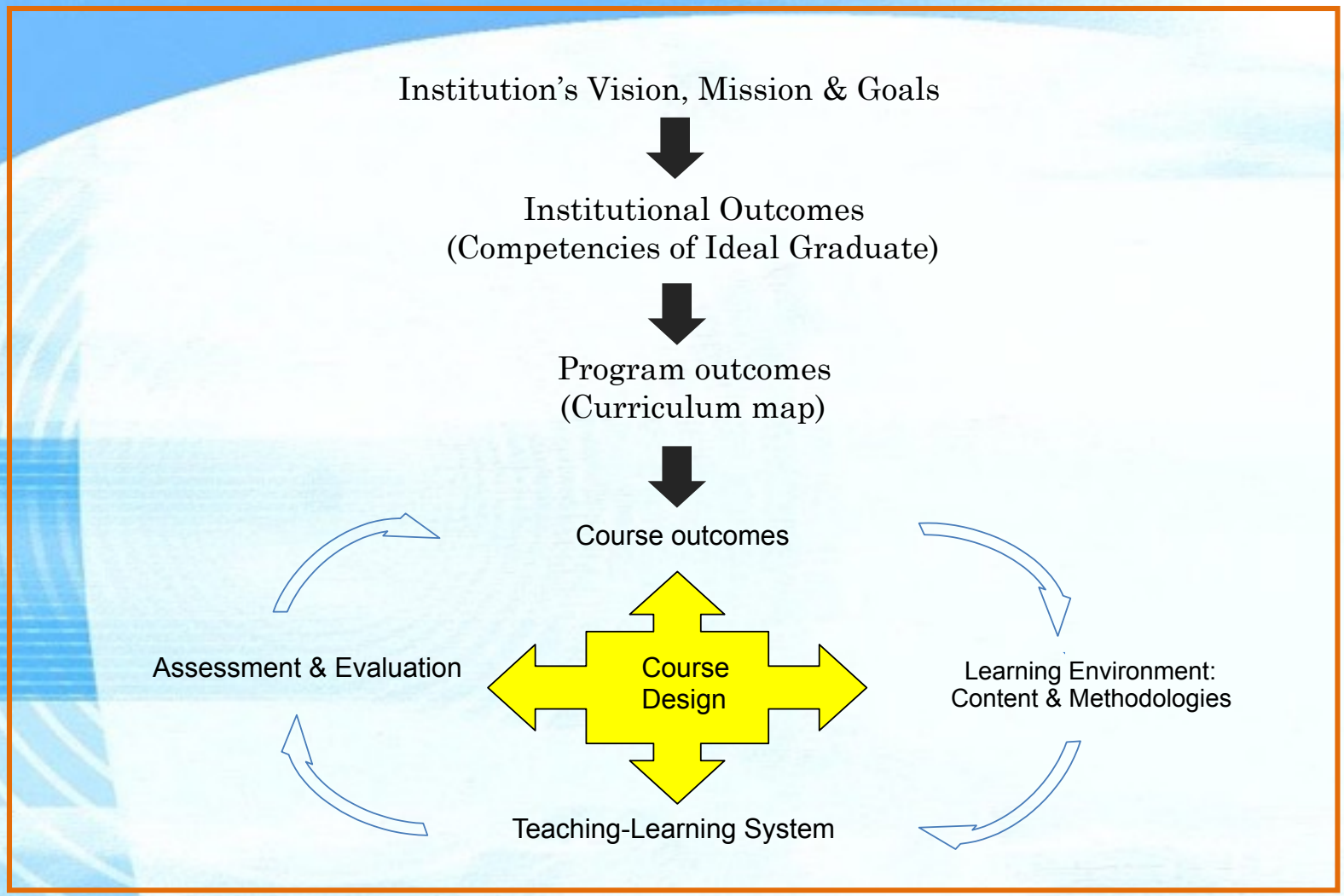


Figure 1. CHED Framework for Outcomes Based Education

Agreed Template

QUALIFICATION OR FUNCTION	CODE NO.	COMPETENCE	TEACHING PLAN		METHODS OF ASSESSMENT	NO. OF STUDENTS	ASSESSMENT			REFERENCES	TIME TABLE
			TEACHIING METHOD	TEACHING MATERIALS/ EQUIPMENT			HOW TO ASSESS	WHEN TO ASSESS	WHERE TO ASSESS		
STCW	STCW Make your own *Units of Competencies* FM 001 FM 002	STCW	Competency Guidelines	Instructor	Competency Guidelines	25	Teacher	Teacher	Teacher		

The following information are also provided and is outlined as follows both for the Lecture and the laboratory

A. Course Specifications

We have assigned a course reference number; course title; descriptive title of the course; co-requisite; pre-requisite, number of hours and number of units; course outcome; terminal learning outcome; STCW Function and program outcomes addressed

Then we identified one or series of competences that will be addressed by the course (Nav 1 or Navigational Instruments with compasses) in reference to the STCW table A-11-1 and table A-11-2 and Table A- 11-4

Then for each **competence,** will provide the STCW (KUP topics); the performance and intended learning outcomes; the teaching (TA) /Learning activities (LA) ; the equipment / materials /teaching aids use ; the references ; the assessment tools and the allocated hours

B. Institutional Educational Objectives/Outcomes
C. Program Educational Objectives
D. Program Outcomes
E. Enabling Learning Outcomes
F. Required Readings
G. Suggested Readings
H. Grading System
I. Remediation
J. Consultation Hours
K. Annexes

Annex 1: Sample Lesson Plan

This will include the Lesson title ; Date ; Course , Section , Enabling Learning Outcomes; Lesson Content; Introduction ; teacher activities and Learner Activities ; Closure; Learner Assessment ; Remediation and Lesson Evaluation with dated signed by the faculty , supervisor and program head .

Annex 2: Sample Assessment Items

Annex 3: Sample Rubrics for paper presentation

This contain the following information: Presenters name; Topic (problem) ; Objectives

The paper presentation is evaluated based on content, delivery slides, delivery by the speaker, ability to keep the audience attention and time limit using the Likert scale of 5 as excellent, 4 as very satisfactory, 3 as satisfactory 2 as fair and 1 as poor

We have agreed to choose a COURSE that is applicable to both Management and operational level and support level as per STCW. The course is **navigation 1 or navigational instruments with compasses**

In reference to STCW Code A page 99 under **Table A-II/1 "** *Specifications of minimum standard of competence for officers in charge of a navigational watch on ships of 500 gross tonnage or more" specifically the* **Function**: Navigation at the operational level, there are 4 columns provided : **Competence**, **KUPs** ; **Methods for demonstrating** competence and **criteria for evaluating** competence

As regards the competence "**Plan and Conduct a Passage and determine position**" that we would like the students to be competent upon taking the **course** (subject) navigation 1 or navigational instruments with compasses , we identify the various **KUPS** related to this course (shaded ones) ;

Hence referring to the STCW Code: **Table A-II/1** *Specifications of minimum standard of competence for officers in charge of a navigational watch on ships of 500 gross tonnage or more*

Function: Navigation at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Methods for demonstrating competence**	**Criteria for evaluating competence**
Plan and conduct a passage and determine position	Celestial navigation Ability to use celestial bodies to determine the ship's position Terrestrial and coastal navigation Ability to determine the ship's position by use of: 1. Landmarks 2. Aids to navigation, including lighthouses, beacons and buoys 3. Dead reckoning, taking into account winds, tides, currents and estimated speed **Thorough knowledge of and ability to use nautical charts, directions, tide tables, notices to mariners, radio navigational warnings and ship's routing information** **Electronic system of position fixing and navigation** **Ability to determine the ship's position by use of electronic navigational aids** **Echo-sounders** **Ability to operate the equipment and apply the information correctly**	Examination and assessment of evidence obtained from one or more of the following: 1. Approved in-service experience 2. Approved training ship experience 3. Approved simulator training, where appropriate 4. Approved laboratory equipment training Using chart catalogues, charts, nautical publications, radio navigational warnings, sextant, azimuth mirror, electronic navigation equipment, echo-sounding equipment, compass	The information obtained from nautical charts and publications is relevant, interpreted correctly and properly applied. All potential navigational hazards are accurately identified The primary method of fixing the ship's position is the most appropriate to the prevailing circumstances and conditions The position is determined within the limits of acceptable instrument/system errors The reliability of the information obtained from the primary method of position fixing is checked at appropriate intervals Calculations and measurements of navigational information are accurate The charts selected are the largest scale suitable for the area of navigation, and charts and publications are corrected in accordance with the latest information available Performance checks and tests to navigation systems comply with manufacturer's recommendations and good navigational practice

Table 1 STCW Code A page 99

Referring to STCW Code, Table A-II/2

Specification of minimum standard of competence for masters and chief mates on ships of 500 gross tonnage or more

Function: Navigation at management level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Methods for demonstrating competence**	**Criteria for evaluating competence**
Plan a voyage and conduct navigation	Voyage planning and navigation for all conditions by acceptable methods of plotting ocean tracks, taking into account, e.g.: 1. Restricted waters 2. Meteorological conditions 3. Ice 4. Restricted visibility 5. Traffic separation schemes 6. Vessel traffic service (VTS) 7. Ares of extensive tidal effects Routing in accordance with the General Provisions on Ships' Routing Reporting in accordance with the General principles for Ship Reporting System and with VTS procedures	Examination and assessment of evidence obtained from one or more of the following: 1. Approved in-service experience 2. Approved simulator training, where appropriate 3. Approved laboratory equipment training Using: chart catalogues, charts, nautical publications and ship particulars	The equipment, charts and nautical publications required for the voyage are enumerated and appropriate to the safe conduct of the voyage The reasons for the planned route are supported by facts and statistical data obtained from relevant sources and publications Positions, courses, distances and time calculations are correct within accepted accuracy standards for navigational equipment All potential navigational hazards are accurately identified

Determine position and the accuracy of resultant position fix by any means	Position determination in all conditions: 1. By celestial observations 2. By terrestrial observations, including the ability to use appropriate charts, notices to mariners and other publications to assess the accuracy of the resulting position fix Using modern electronic navigational aids, with specific knowledge of their operating principles, limitations, sources of error, detection of misrepresentation of information and methods of correction to obtain accurate position fixing	Examination and assessment of evidence obtained from one or more of the following: 1. Approved in-service experience 2. Approved simulator training, where appropriate 3. Approved laboratory equipment training using: 1. Charts, nautical almanac, plotting sheets,, chronometer, sextant and a calculator 2. Charts, nautical publications and navigational instruments (azimuth mirror, sextant, log, sounding equipment, compass) Radar, terrestrial electronic position-fixing systems, satellite navigation systems and appropriate nautical charts and publications	The primary method chosen for fixing the ship's position is the most appropriate to the prevailing circumstances and conditions The fix obtained by celestial observations is within accepted accuracy levels The fix obtained by terrestrial observations is within accepted accuracy levels The accuracy of the resulting fix is properly assessed The fix obtained by the use of electronic navigational aids is within the accuracy standards of the systems in use. The possible errors affecting the accuracy of the resulting position are stated and methods of minimizing the effects of system errors on the resulting position are properly applied

Determine and allow for compass errors	**Ability to determine and allow for errors of the magnetic and gyro-compasses:** **Knowledge of the principles of magnetic and gyro-compasses** **An understanding of systems under the control of the master gyro and a knowledge of the operation and care of the main types of gyro-compass**	Examinations and assessment of evidence obtained from one or more of the following: 1. Approved in-service experience 2. Approved simulator training, where appropriate 3. **Approved laboratory training** **Using: celestial observations, terrestrial bearings and comparison between magnetic and gyro-compasses**	**The method and frequency of checks for errors of magnetic and gyro-compasses ensures accuracy of information**

Table 3 STCW Code page 112

Referring to STCW Coode table A –II-4 ***Specification of minimum standard of competence for ratings forming part of a navigational watch***

Function: Navigation at the support level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Methods for demonstrating competence**	**Criteria for evaluating competence**
Steer the ship and also comply with helm orders in the English language	**Use of magnetic and gyro-compasses** Helm orders Change-over from automatic pilot to hand steering and vice versa	Assessment of evidence obtained from: 1. Practical test, or 2. Approved in-service, or 3. Approved training ship experience	A steady course is steered within acceptable limits, having regard to the area of navigation and prevailing sea state. Alterations of course are smooth and controlled. Communications are clear and concise at all times and orders are acknowledged in a seamanlike manner
Keep a proper look-out by sight and hearing	Responsibilities of a look-out, including reporting the approximate bearing of a sound signal, light or other object in degrees or points	Assessment of evidence obtained from: 1. Practical test, or 2. Approved in-service, or 3. Approved training ship experience	Sound signals, light and other objects are promptly detected and their approximate bearing, in degrees or points, is reported to the officer of the watch

Please see attached course as an example

Navigation 1 or Navigational Instruments with Compasses

SYLLABUS FOR NAV1 D111

- **Lecture on Nav1 D111**
- **Laboratory or Nav1 D111L**

In preparation of this task at MAAP, the following MAAP subject matter experts are gratefully acknowledge:

1. Capt Romeo Alulod (author)
2. Capt Eulaio Biotin – Function Head (F2)- management level
3. **C/M Ace Gonzales – Function Head (F1)-operational level**

NOTES: Using MARZ013

Unit of Competency: F1M – Plan and conduct a passage

Unit Descriptor: This unit of competency involves the skills and knowledge required to plan and conduct a passage and to determine position on a vessel using a range of bridge equipment, and to evaluate meteorological information to inform passage planning

Licensing /regulatory information: Not applicable

Pre-requisites; Not Applicable

Employability Skills Information: Yes please identify

Elements and Performance Criteria Pre-Content: Elements describe the essential outcomes of a unit of competency. Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1. Plan passage

1. 1. ***Navigational charts, nautical publications and related documentations*** are selected for the area of navigation and corrected according to the latest information available.
1. 2. Information from charts and publications is interpreted and applied to accurately identify potential ***navigational hazards*** relevant to the proposed voyage
1. 3. State of the tide at specified locations is determined and findings are applied to the passage plan
1. 4. Route for voyage is determined and critical points along the proposed route of voyage are identified and plotted
1. 5. Accurate calculations and measurements of navigational information are made
1. 6. Meteorological information is obtained and interpreted, and weather and sea condition hazards relevant to the proposed voyage are identified prior to departure
1. 7. Route is modified as required to take into account weather and sea condition hazards
1. 8. Planned route for voyage is recorded according to organizational and regulatory requirements

2. Conduct passage

2.1. ***Mode of steering*** is selected appropriate for the prevailing weather, sea and traffic conditions and intended maneuvers

2. 2. Measurements and observations of sea and weather conditions are used to determine vessel speed and direction

2. 3. Information from bridge equipment is interpreted to identify navigational hazards and fix vessel positions

2. 4. Alterations to vessel course or speed are made to meet prevailing circumstances and changing ***conditions***

2. 5. Navigational maneuvers are conducted within safe operational limits of vessel

2. 6. Details of passage are recorded in vessel log according to regulations

2. 7. Variations to planned route are documented prior to archiving on completion of the voyage

3. Fix Vessel Position

3. 1. ***Primary position fixing method*** is selected according to prevailing circumstances and conditions
3. 2. Position is fixed using selected method and information derived from relevant wheelhouse equipment
3. 3. Position is determined within limits of acceptable instrument/system errors
3. 4. Position is recorded on a navigational chart according to regulatory requirements
3. 5. Fixes are taken at time intervals appropriate for prevailing navigational conditions
3. 6. Reliability of information obtained from primary method of position fixing is checked at appropriate intervals
3. 7. Performance checks of position fixing instruments and wheelhouse equipment are carried out according to organizational procedures and manufacturer instructions

4. Determine appropriate action to take with respect to plotted position

4. 1. Assessment of the set, drift and leeway being experienced by the vessel is made

4. 2. Course is adjusted to maintain or resume planned route where the position indicates a deviation has occurred

4. 3. Dead reckoning (DR) and/or estimated position (EP) is projected along planned route according to the course made good between previously observed positions

5. Analyze navigational system performance

5. 1. Theoretical performance of navigational system is determined

5. 2. Measurement equipment is selected, and checks and tests are conducted

5. 3. Data is analyzed and theoretical performance is checked with actual performance

5. 4. Significance of variation between theoretical and actual performance is determined

5. 5. Appropriate action is taken to bring performance to acceptable instrument/system errors

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required Skills:

- Accurately measure and observe weather conditions
- Accurately prepare calculations and measurements of navigational information
- Adjust steering controls for optimum performance
- Calculate courses using plane, Mercator and great circle sailing methods
- Change over from manual to automatic control and vice versa
- Check reliability of information obtained from primary method of position fixing at appropriate intervals
- Correctly interpret and apply meteorological information
- Determine errors in magnetic and gyro compasses, and correctly apply to courses and bearings
- Determine errors of magnetic and gyro compasses, using celestial and terrestrial means, and to allow for such errors

- Determine vessel position by use of:
  - Landmarks
  - Aids to navigation including lighthouses, beacons and buoys
  - Rising and dipping distances of lights and the use of horizontal angles
  - Dead reckoning, taking into account winds, tides, currents and estimated speed
  - Electronic navigational aids
- Determine vessel position within the limits of acceptable instrument/system errors
- Estimate position using dead reckoning
- Interpret nautical charts and publications
- Maintain charts and publications by applying up-to-date corrections to both paper and electronic charts and publications

- Operate echo-sounders and apply the information correctly
- Read the aneroid barometer and interpret the information obtained
- Select mode of steering most suitable for prevailing weather, sea and traffic conditions and intended maneuvers
- Select most appropriate primary method of fixing vessel position for the prevailing circumstances and conditions
- Use and interpret information obtained from ship borne meteorological instruments
- Use celestial bodies to determine vessel position
- Use chart catalogues, charts, nautical publications, radio navigation warnings, sextant, azimuth mirror, electronic navigation equipment, echo-sounding equipment, compass
- Use nautical charts and publications
- Use meteorological information available

Required Knowledge:

- Basic meteorological terms
- Characteristics of the various weather systems, reporting procedures and recording systems
- Charted information including that in the Title Block, Zones of Confidence Diagrams and Datums
- Compass error from transit bearings or by bearings taken from a known position
- Determining the times and heights of high and low water from Australian or local tide tables for any port and the relevance of chart datum
- Effects of current and of leeway on the course and speed of the vessel (without calculations)
- Finding the variation from the chart
- Fixing vessel position by:
  - Simultaneous bearings, transits of coastal features, and by running fix
  - Radar changes and bearings

- Information given on a chart or plan
- Interpreting the set and drift of the current from information available on the chart
- Measuring distance on a chart
- Meteorological instruments and their use
- Nautical charts and publications
- Plane, Mercator and great circle sailing concepts
- Principles of magnetic and gyro compasses
- Recognizing the presence of either or both factors
- Relating coastal features to a chart
- Relationship between compass, magnetic, true and gyro courses and bearings
- Relative bearings

- Selection of suitable points for bearings
- Sources of weather forecasts and the interpretation of that information
- Steering control systems
- Steering control systems operating procedures
- Tropical revolving storms and weather associated with such storms
- Use and limitations on the use of electronic position fixing equipment found on small vessels
- Use of deviation card without mathematical interpolation
- Using a single position line to assist in clearing dangers
- Using modern electronic navigational aids to determine vessel position
- Using soundings in determining position
- Using terrestrial observations to determine vessel position individually or in combination with other methods
- Work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, the required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance, Criteria, Required Skills, Required Knowledge and include:

- Producing accurate and reliable information
- Ensuring currency of relevant legislative and regulatory knowledge.

Context of and specific resources for assessment

Performance is demonstrated consistently over time and in a suitable range of contexts.

Resources for assessment include access to:

- Industry-approved marine operations site where planning and conducting a passage may be conducted
- Tools, equipment and personal protective equipment currently used in industry
- Relevant regulatory and equipment documentation that impacts on work activities
- Range of relevant exercises, case studies and/or other simulated practical and knowledge assessments
- Appropriate range of relevant operational situations in the workplace.

In both real and simulated environments, access is required to:

- Relevant and appropriate materials and equipment
- Applicable documentation including workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical assessment must occur in an:

- Appropriately simulated workplace environment and/or
- Appropriate range of situations in the workplace.

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate to this unit:

- Direct observation of the candidate planning and conducting a passage
- Direct observation of the candidate applying relevant WHS/OHS requirements and work practices.

Guidance information for assessment

Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

In all cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.

Assessment processes and techniques must be appropriate to the language and literacy requirements of the work being performed and the capacity of the candidate

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicized wording, if used in the performance criteria, is detailed below.

Navigational charts, nautical publications and related documentation may include

- Electronic chart display systems
- Nautical Almanac
- Nautical tables

- Notice to Mariners
- Paper charts
- Radio navigational warnings
- Sailing directions

- Temporary warning notices
- Tide tables
- Vessel routing information
- Weather reports and warnings

Navigational hazards may include

- Restricted visibility
- Shallow ground
- Traffic
- Unlit beacons

Mode of steering may include

- Automatic pilot
- Electric systems
- Hydraulic systems

Conditions may include

- Buoyage
- Overall passage plan requirements
- Prevailing weather and sea conditions
- Proximity and course of other vessels
- Relevant navigational hazards
- Signage

Primary position fixing method may include

- Celestial observations
- Radar ranges or bearings
- Radio navigation aids
- Running fix
- Simultaneous bearings or transits of coastal features
- Sounding to determine position
- Terrestrial observation

MARH6002A Manage the navigation of a vessel 500 gross tonnage or more

Modification History

Release 1
This is the first release of this unit.

Unit Descriptor

This unit involves the skills and knowledge required to manage the planning of a voyage and the navigation of a vessel of 500 gross tonnages or more.

Application of the Unit

This unit applies to maritime workers working in the maritime industry as a Master Unlimited.

Licensing/Regulatory Information

Not applicable.

Pre- Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and performance Criteria

1. **Oversee development of passage plan**

   1. 1.Requirements of passage are established.

   1. 2. Reasons for planned route are supported by facts and statistical data obtained from relevant ***sources and publications***

   1. 3. Positions, courses, distances and time calculations are checked for correctness within accepted accuracy standards for navigational equipment

   1. 4. All potential navigational hazards are accurately identified

Elements and performance Criteria

2. Development and implement watch keeping arrangements and procedures

2. 1. ***Watch keeping arrangements*** and procedures are developed according to principles bridge resource management, and organizational and regulatory requirements

2. 2. Principles of resource management are appropriately applied in establishing watch keeping arrangements and procedures and in developing an effective bridge working system

2. 3. Communication strategies are developed to link watch keeping procedures with all aspects of vessel operations

2. 4. Fatigue management strategies are developed according to organizational and regulatory requirements

2. 5. Corrective action procedures are developed and monitored

2. 6. Procedures for reporting, recording and responding to emergencies and non-compliance are established

Elements and performance Criteria

3. Monitor bridge team in implementing passage plan

3. 1. Work schedule for bridge team is detailed according to bridge resource management principles
3. 2. Risk control measures are evaluated against passage plan
3. 3. Navigation requirements are communicated to bridge team
3.4. Individuals are fully briefed and responsibilities coordinated

3. 5. Navigation tasks are carried out according to passage plan

3. 6. Ongoing checks and ***position determination*** are conducted according to organizational procedures

3. 7. ***Non-routine problems*** related to navigation of vessel are solved

3. 8. Navigational data is signed off according to organizational procedures

3. 9. Work schedule for bridge team is detailed according to bridge resource management principles

Elements and performance Criteria

4. Interpret and evaluate information from electronic navigational system

4. 1. Data from radar plotting sheet is interpreted and analyzed to anticipate potential collisions

4. 2. Data produced by other electronic navigational aids is interpreted and used to assist navigational command decisions, taking into account known limitations and errors associated with each type of aid

4. 3. Information obtained through a single vessel or multiple vessel analysis of radar plots or other electronic navigational data is used to make command decisions on action needed to avoid collisions

4. 4. Radar data is used to obtain position fix for vessel using electronic bearing lines and variable range markers

Elements and performance Criteria

5. Navigate in complex situations

5. 1. Measurements and observations of sea and weather conditions are used to determine vessel speed and direction in ***complex situations***

5. 2. Information from bridge equipment is interpreted to identify navigational hazards and to fix vessel positions

5. 3. Alterations to vessel course or speed are made to meet prevailing circumstances and changing conditions

5. 4. Navigational maneuvers are conducted within safe operational limits of vessel

5. 5. Details of passage are recorded in vessel log according to regulations

5. 6. Variations to planned route are documented prior to archiving on completion of voyage

Elements and performance Criteria

6. Manage emergencies

6. 1. Bridge team is taken charge of when called to bridge in response to an ***emergency***

6. 2. Safety management system procedures are implemented when taking over bridge watch from officer of the watch

6. 3. Appropriate action is taken to initiate search and rescue procedures on receipt of distress signal

6. 4. Advice is provided to watchkeeper regarding response to emergency situations

Elements and performance Criteria

7. Maintain navigational equipment

7. 1. Navigational charts, nautical publications and related documentations are stored and maintained according to organizational procedures

7. 2. Inventory of navigational charts, nautical publications and related documentation is established and kept according to organizational procedures

7. 3. Navigational charts, nautical publications and related documentation are ordered and updated form relevant sources to ensure available data needed for voyage planning is current

7. 4. Performance checks and tests of navigation position fixing instruments and systems are carried out according to organizational procedures and manufacturer instructions

Elements and performance Criteria

8. Prepare reports and documentation relevant to passage

8. 1. Passage information is recorded and reported in required format, style, structure and timeframe

8. 2. All information is recorded and reported according to legislative requirements

8. 3. Technology is used to store and retrieve information

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required Skills:

- Accurately identify all potential navigational hazards
- Choose the most appropriate primary method for fixing vessel position given the prevailing circumstances and conditions
- Conduct performance checks of navigation position fixing instruments and systems
- Correctly calculate positions, courses, distances and time within accepted accuracy standards for navigational equipment
- Determine and allow for errors of magnetic and gyro-compass
- Determine position in all conditions by celestial observations, terrestrial observations and using modem navigational aids within accepted accuracy levels
- Enumerate the equipment , charts and nautical publications required for the voyage and appropriate to the safe conduct of the voyage
- Establish and maintain watchkeeping arrangements in compliance with international regulations and guidelines so as to ensure the safety of navigation, protection of the marine environment and the safety of the vessel and persons on board

- Properly assess accuracy of fix
- Recognize faulty equipment and readings, and take appropriate action
- Recognize problems that may be experienced when planning and navigating a passage, and take appropriate action
- Report according to General Principles for Ship Reporting Systems and vessel traffic service (VTS) procedures
- Support reasons for planned route using facts and statistical data obtained from relevant sources and publications
- Undertake routing according to the General Provisions on Ship's Routing
- Use chart catalogue, charts, nautical publications and vessel particulars to plan and navigate a passage

Required Knowledge:

- AMSA Watchkeeping Standards Booklet (including the Manila Amendments)
- Content, application and intent of the bridge resource management principles to be observed in keeping a navigational watch
- Content, application and intent of the International Regulations for Preventing Collisions at Sea, 1972, as amended
- General Principles for Ship's Reporting Systems
- General Provisions on Ship's Routing
- Method and frequency of checks for errors of magnetic and gyro-compasses to ensure accuracy of information
- Methods for fixing position of a vessel
- Modern electronic navigational aids, their operating principles, limitations, sources of error, detection of misrepresentation of information and methods of correction to obtain accurate position fixing

- Operation and care of the main types of gyro-compass
- Principles of magnetic and gyro-compasses
- Problems experienced when fixing vessel position and appropriate action and solutions
- Procedures for filing and maintaining navigational charts, nautical publications and related documentation in serviceable condition
- Procedures for swinging a vessel to determine deviation
- Relevant AMSA Marine Orders
- Requirements for effective passage planning including contingency planning
- Systems under control of the master gyro
- Voyage planning and navigation for all conditions by acceptable methods of plotting ocean tracks
- VTS procedures
- Vessel reporting systems and their use in planning and conducting a voyage
- Work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, the required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessments and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance Criteria, Required Skills, Required Knowledge and include:

- Planning and navigating voyage for all conditions including restricted waters, meteorological conditions, ice, restricted visibility, traffic separation schemes, VTS areas and areas of extensive tidal effects
- Ensuring currency of relevant legislative and regulatory knowledge

Ensuring currency of relevant reference material

Context of and specific resources for assessment

Performance is demonstrated consistently over time and in a suitable range of contexts.

Resources for assessment include access to:

- Industry-approved marine operations site where managing the navigation of a vessel of 500 gross tonnage or more may be conducted
- Tools, equipment and personal protective equipment currently used in industry
- Relevant regulatory and equipment documentation that impacts on work activities
- Range of relevant exercises, case studies and/or other simulated practical and knowledge assessments
- Appropriate range of relevant operational situations in the workplace.

In both real and simulated environments, access is required to:

- Relevant and appropriate materials and equipment

Applicable documentation including workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical assessment must occur in an:

- Appropriately simulated workplace environment and/or
- Appropriate range of situations in the workplace.

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate to this unit:

- Direct observation of the candidate managing the navigation of a vessel of 500 gross tonnage
- Direct observation of the candidate applying relevant WHS/OHs requirements and work practices.

Guidance information for assessment

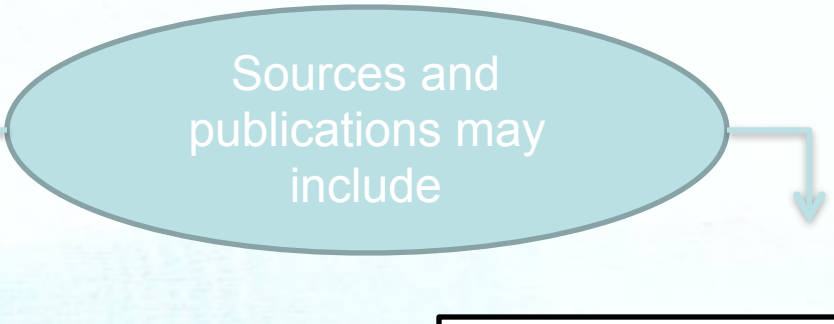
➡ Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

In all cases where practical assessment is used it should be combined with targeted questioning to assess Required Knowledge.

Assessment processes and techniques must be appropriate to the language and literacy requirements of the work being performed and the capacity of the candidate.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicized wording, if used in the performance criteria, is detailed below.



- AMSA Marine Orders
- Annual and weekly Notices to Mariners
- Nautical almanac
- Navigational chart availability

- Radio signals, light lists, sailing directions, tide tables and chart catalogues
- Safety management system procedures
- Ship reporting systems and requirements
- Ship's routing information

Watchkeeping arrangements must include:

- Clear instruction to watchkeeping officers in the Standing Orders from the Master
- Establishing a proper lookout separate from the helmsman
- Fatigue management strategies
- Hours of work schedule established to ensure correct rest periods are maintained
- Watch hand over procedures

Position determination may include

- Azimuth mirrors
- Chronometer
- Doppler and electronic logs
- Echo sounders

- ECS and ECDIS systems
- Integrated navigation systems
- Magnetic and gyro-compasses and repeaters
- Paper navigational charts
- Radar and other electronic navigation devices
- Sextant

Non-routine problems may include

- Equipment failure
- Lack of appropriate resources
- Potential collision and emergency situations
- Weather conditions precluding the establishment of vessel position

Complex situations must include

- Adverse weather
- Areas of extensive tidal effects
- Ice
- Restricted visibility
- Restricted waters
- Traffic separation schemes
- VTS areas
- When summoned to the bridge by the duty officer

Emergencies may include

- Engine failure
- Failure of navigational equipment
- Potential close quarter situations

Unit Sector(s)

Not applicable.

Competency Field

Not applicable.

Using the Resource

This assessment tool comprises two booklets.

Participant Guide - This booklet contains a brief explanation of competencies; the necessary information for participants to complete their assessment for this skill set; copies of the competency units; and a glossary.

Assessor Resource - This booklet contains the assessments, mapping, forms to record evidence, forms for third party reports and final results forms.

The booklets are designed to be used together as shown in Figure 1 below.

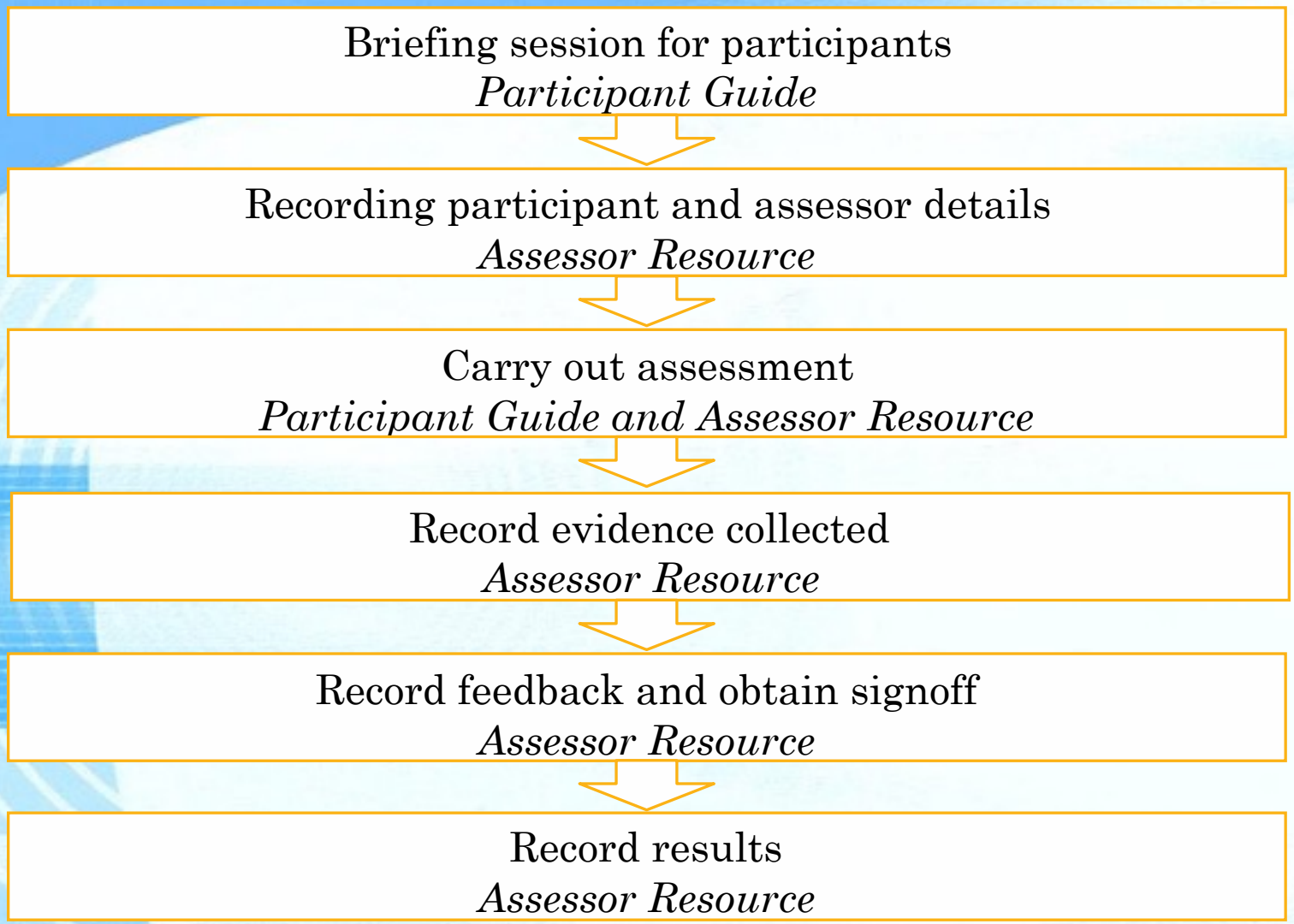
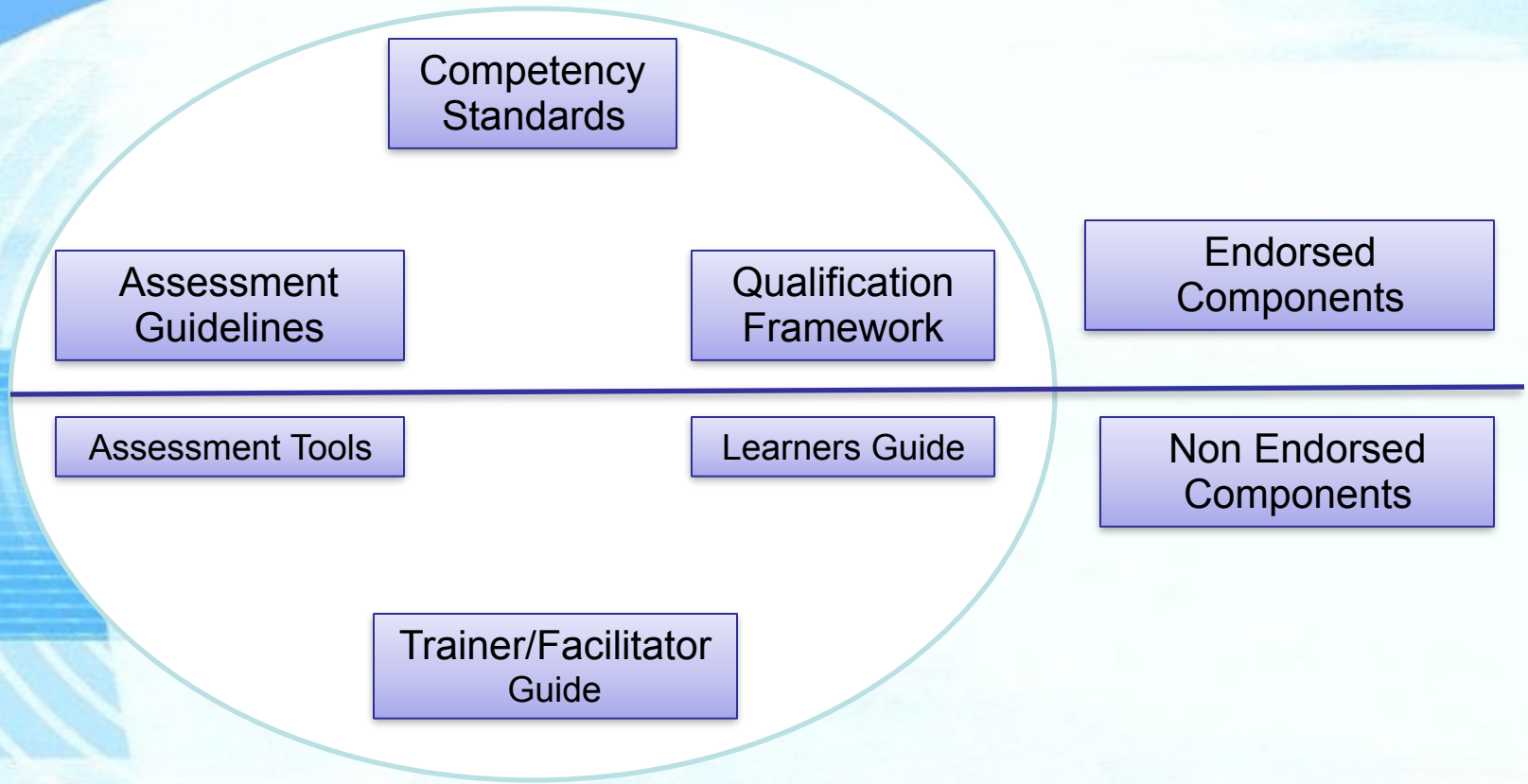


Figure 1 - Applying the assessment tool

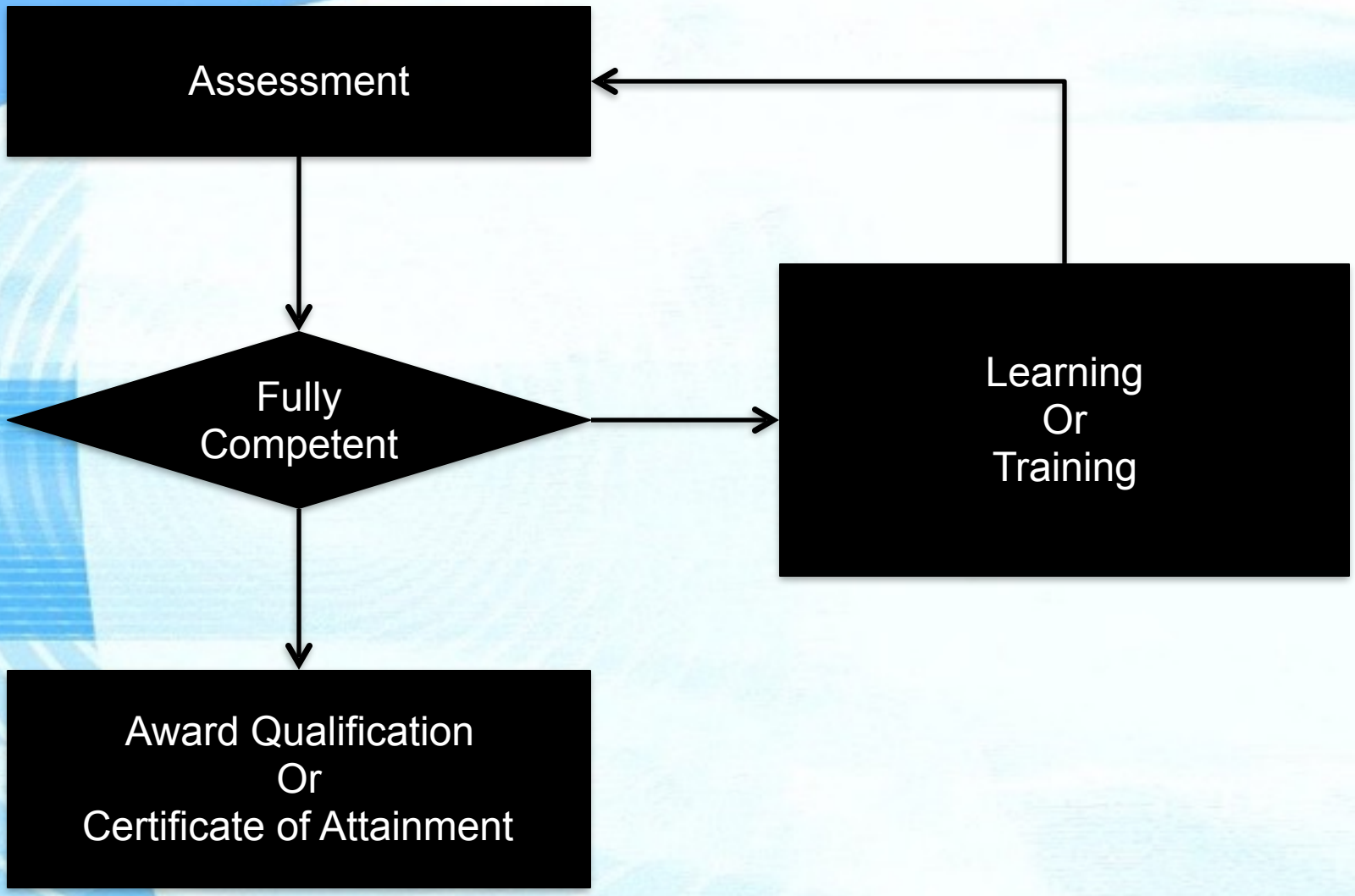
Examples of Assessment Methodologies

Observation Checklist	This is a checklist by a trainer or the workplace assessor while observing the learner's performance on relative tasks.
Practical Demonstration	Demonstrates competence by showing steps or process used to produce a product or service
Project	Demonstration of skills and knowledge in the completion of a project.
360° Feedback	Using a structured process to gather and analyze feedback from peers, supervisor and people who are supervised.
Case Study	Response to a situation which is presented to the learner. Used to ascertain the learner's problem solving techniques and underpinning knowledge
Oral Presentation	Learners give an oral presentation about an area of knowledge or their projects to a small group, usually including a trainer, their assessor, their colleagues and any other interested parties.
Journal	A journal that records learning activities, skills and knowledge acquisition.
Problem Solving	Implementing problem solving techniques to analyze a product or process for problems or errors.
Project	Demonstration of skills and knowledge in the completion of a project.
Video or Audio Types	Recording performance in the workplace that is subsequently reviewed by an assessor.

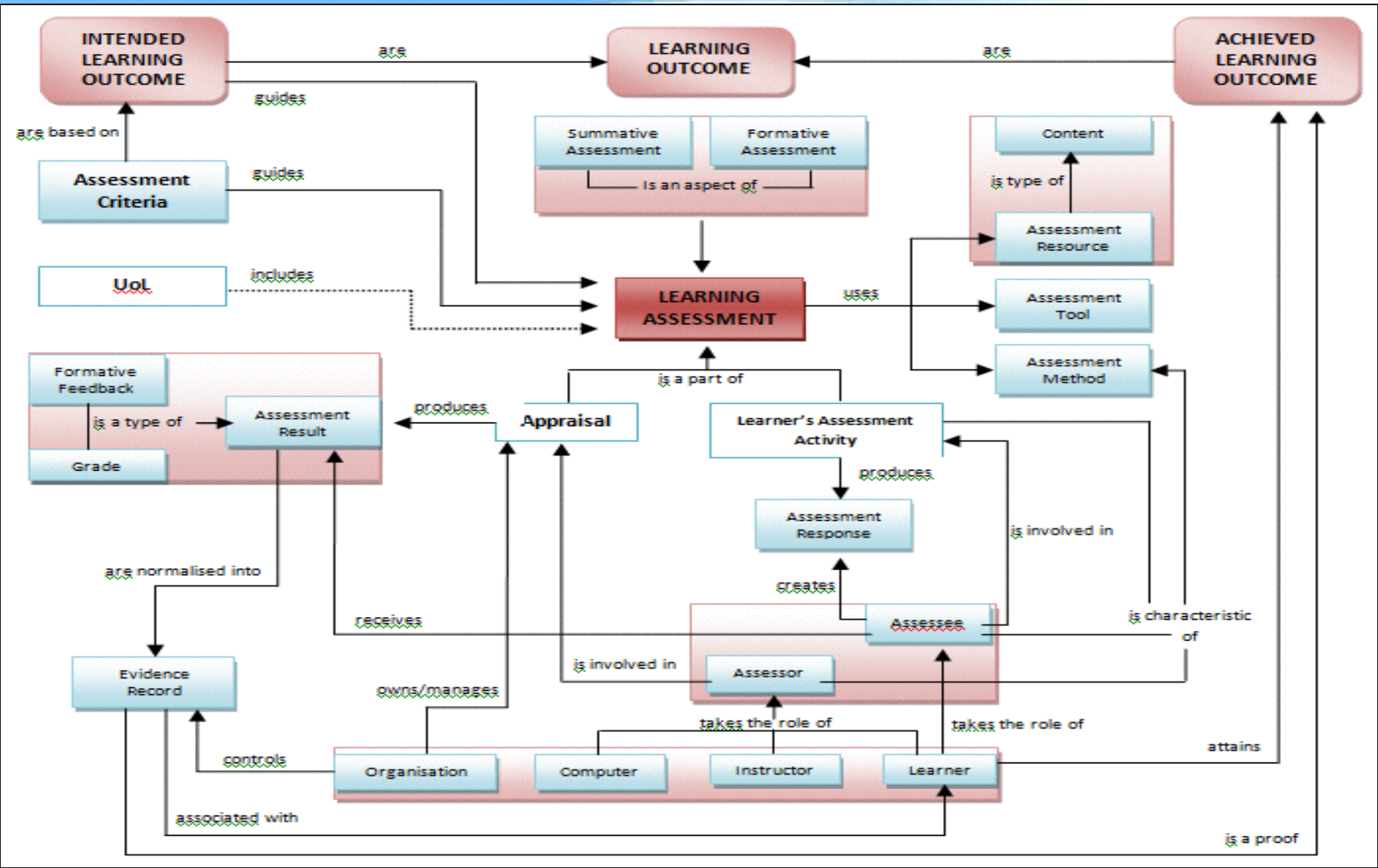
Training Packages – The Elements

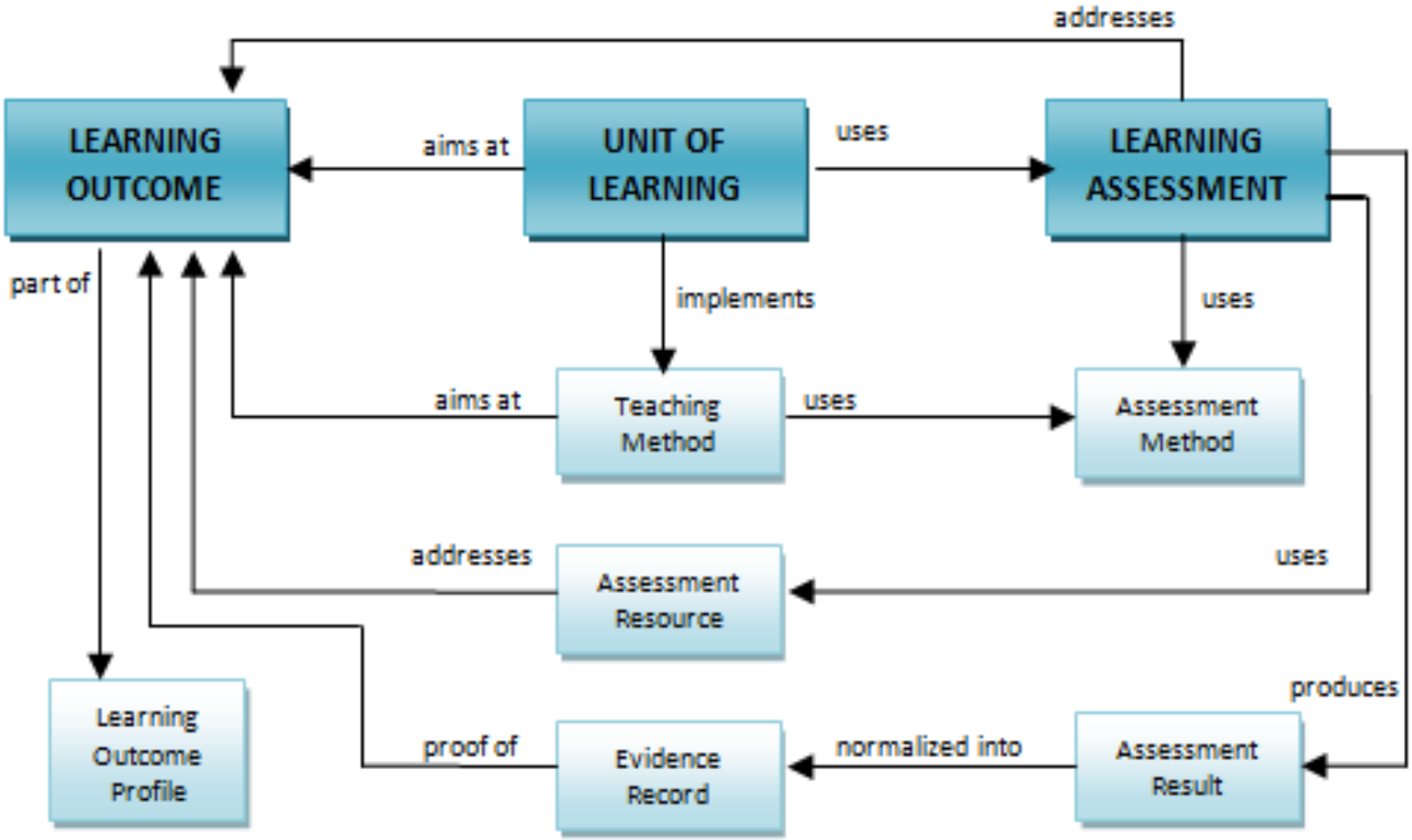


A Better Approach for Structuring Training or Learning?



Conceptual Map for Learning Assessment





Concept map for learning outcomes-based assessment

Thank You

To the 14 participating Institutions

(AJ , NYK, AIMS, Mariners, IDESS, VAM, LPU, PMMA, VMA, Malayan/Philcamsat, ZCMST, MTC, MAAP, UC, [illegible])

Thank you