

Diver Certification Board of Canada

CERTIFICATION SCHEME FOR REMOTELY OPERATED VEHICLE (ROV) PERSONNEL

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1.0 PURPOSE

The purpose of certifying the competence of ROV Personnel (Pilot/Technicians, Supervisors and Superintendents) is to help ensure the safety of personnel, equipment, assets and the environment and includes the protection of divers who often work in the same underwater area as a ROV.

In general the levels of certification and the competencies required to obtain ROV certification are designed to meet the requirements of ROV Contractors and ROV end users.

The procedure to apply for certification by the Diver Certification Board of Canada is outlined in Appendix 2.

2.0 DEFINITIONS

For the purposes of this scheme, the following definitions apply.

- **Shall**

Requirement to be strictly followed in order to conform to the scheme in which no deviation will be permitted.

- **Should**

Indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others or that a certain course of action is preferred but not a firm requirement.

3.0 REMOTELY OPERATED VEHICLE (ROV) PERSONNEL

3.1 General Requirements

Due to the nature and complexity of ROV systems, personnel operating, troubleshooting and maintaining ROV systems require broad based competencies. Personnel operating ROV systems require training in a wide range of specialized fields.

Reference is made to:

1. International Marine Contractors Association (IMCA) R 14/01 "*Competence Assurance & Assessment Scheme*."
2. Norsak Standard U-102. *Remotely Operated Vehicle (ROV) Services*.
3. MATE Guidelines for ROV Technicians

Notes:

1. All ROV candidates/personnel shall maintain a Diver Certification Board of Canada (DCBC) recognized ROV logbook as proof of logged piloting experience.
2. Remotely Operated Vehicle pilots used for the ROV monitoring of manned diving operations, shall at a minimum, meet ROV Senior Pilot/Technician competencies when operating a Class III ROV. Pilot/Technician Level 1 and Pilot/Technician 2 are permitted to operate a Class I or Class II ROV during Diver monitoring operations. Pilot/Technician Level 1 personnel are permitted to operate a Class III ROV during diver monitoring operations, while under the direct supervision of a Class III ROV Supervisor or Superintendent.
4. ROV candidates who do not meet the identified category requirements but who can provide documentary evidence that they have been gainfully employed in the certification category being applied for, shall be permitted to undergo a DCBC Prior Learning (PLAR) review to determine acceptability.

4.0 REMOTELY OPERATED VEHICLE (ROV) CLASSIFICATION

4.1 Class I – Observation

Pure observation vehicles are physically limited to video observation. Generally they are small vehicles fitted with video camera, lights and thrusters. They cannot undertake any other task without considerable modification.

4.2 Class II – Observation With Payload Capability

Vehicles capable of carrying additional sensors such as still color cameras, cathodic protection measurement systems, additional video cameras and sonar systems. Class II vehicles should be capable of operating without loss of original function while carrying at least two additional sensors. Class II vehicles may be fitted with a basic grabber/manipulator system.

4.3 Class III – Work Class

Underwater vehicles large enough to carry additional sensors and/or complex manipulators. Class III vehicles commonly have a multiplexing capability that allows additional sensors and tools to operate without being “hardwired” through the umbilical system. These vehicles are larger and more powerful than Class I and Class II.

Class III A – Work class vehicles < 100 Hp

Class III B – Work class vehicles 100 Hp to 150 Hp

Class III C – Work class vehicles >150 Hp

4.4 Class IV – Seabed-Working Vehicles

Seabed working vehicles positioned on the seabed by a wheel or belt traction system, or thruster propellers or water jet power, or by combinations of any of these propulsion methods. Class IV vehicles are typically much larger and heavier than Class III Work Class vehicles, and are configured for special purpose tasks. Such tasks typically include cable and pipeline trenching, excavation, dredging and other remotely operated seabed construction activities.

5.0 LEVELS OF CERTIFICATION

Under the DCBC ROV personnel competency scheme, the following certifications will be issued.

- a) ROV Pilot/Technician Level 2 (Applicable to all classes of ROV)
- b) ROV Pilot/Technician Level 1 (Specific to the classes 1 & 2 or classes 3 & 4)
- c) ROV Senior Pilot/Technician (Specific to the class of vehicle)
- d) ROV Pilot/Technician Supervisor (Specific to the class of vehicle)
- e) ROV Superintendent (Applicable to all classes of ROV)

5.1 Requirements for Certification

5.1.1 ROV Pilot/Technician Level 2

To enter a program leading to certification as an ROV Pilot/Technician Level 2 a candidate would have to provide evidence of:

- A nationally-recognised technical or trade qualification (military service qualification and/or national vocational qualification is acceptable) accepted in one or more of the following subjects:
 - i) electrical
 - ii) electronic
 - iii) hydraulics
 - iv) mechanics

OR

- i) A nationally-recognised technical qualification (not covered by the above) in a relevant subject;

OR

- ii) In certain circumstances, candidates who do not meet the above but have extensive industrial experience, supported by evidence, may be acceptable.

To become certified as an ROV Pilot/Technician Level 2 the candidate would have to satisfactorily complete formal training of an adequate content and duration acceptable to the DCBC in the operation, maintenance and repair of various ROV system types.

Program content shall cover all key subject matters as identified above.

and Formal training in lock-out/tag-out safety procedures.

and Training in ROV deployment methodologies to encompass at a minimum, an understanding of applicable:

- Safety
- Inspection
- Operation
- Working Load Limit (WLL) requirements and;

and Successful completion of a ROV familiarization training module similar to that described in IMCA Guidance Note R 002 Rev 1. (To be written in here)

and A minimum 20 hours documented ROV piloting experience, on an ROV or on a simulator, undertaken whilst under supervision by an experienced ROV pilot.

5.1.2 ROV Pilot/Technician Level 1 (Classes 1 & 2 or Classes 3 & 4)

The ROV Pilot/Technician Level 1 candidate shall demonstrate the competencies of a ROV Pilot/Technician Level 2, and in addition shall demonstrate the Level 1 competencies indicated in **Appendix 1**. He/she shall also have

- Six (6) months documented experience working in industry as an ROV Pilot/Technician Level 2
- Seventy-five (75) hours logged piloting experience (any class of ROV) as an ROV Pilot/Technician Level 2 , of which 20 hours must be actual ROV piloting.

5.1.3 ROV Senior Pilot/Technician

The ROV Senior Pilot/Technician candidate shall demonstrate the competencies of a ROV Pilot/Technician Level 1, and in addition shall demonstrate the Senior Pilot/Technician competencies indicated in Appendix 1. He/she shall also have

- One (1) year experience as an ROV Pilot/Technician Level 1
- One hundred (100) hours logged piloting experience on the class of ROV for which certification is being sought as an ROV Pilot/Technician Level 1

5.1.4 ROV Pilot/Technician Supervisor

The ROV Pilot/Technician Supervisor candidate shall demonstrate the requirements as that of a ROV Senior Pilot/Technician as well as have attained:

- ONE year experience as a Senior ROV Pilot/Technician (to be discussed further)
- One hundred hours logged piloting experience applicable to the class of ROV for which certification as an ROV Senior Pilot/Technician is requested.
- Formal administrative/leadership management training, including applicable legislation
- Satisfactory completion of an industrial safety supervisor course
- Ability to understand and implement ROV project manuals and project procedures for the work
- Be competent in the best practice training of ROV personnel
- Be competent in evaluating ROV personnel relating to ROV safety, operational and technical competencies
- An ability to document/communicate task reporting;
- Experience as a trainee supervisor on 20 ROV deployments under the supervision of a qualified supervisor.

5.1.5 ROV Superintendent (Offshore)

The ROV Superintendent candidate shall demonstrate the competencies as that of a ROV Pilot/Technician Supervisor as well as have attained:

- Three (3) years experience as a ROV Pilot/Technician Supervisor, functioning in a wide variety of ROV tasking/operations offshore. Superintendent candidate's competencies should include, but not be limited to the following ROV knowledge based areas:
 - Survey Operations
 - Drilling Support Operations
 - Completions Operations
 - Intervention Operations
 - Salvage
- Experience in overall planning and management of offshore operations

- Experience in the development of ROV operational procedures
- Be fully familiar with conducting ROV operations from a variety of platforms to include, Offshore Supply Vessel, Mobile Offshore Drilling Unit (MODU), Construction Vessels (barge and ship shape) and Diving Support Vessels.
- Formal training, to an adequate duration and content acceptable to the DCBC in the following disciplines:
 - Project Management (minimum 5 days)
 - Safety/Risk Management (minimum duration 5 days)
 - Quality Management (minimum duration 3 days)
 - Contract Management (minimum duration 2 days)
 - Operations of and risks associated with dynamically positioned (DP) vessels.



**Diver Certification
Board of Canada**

CERTIFICATION SCHEME FOR ROV PERSONNEL

Pilot/Technician Level 1

EMPLOYEE MINIMUM ENTRY LEVEL REQUIREMENTS

Pilot/Technician Level 1

Entry Level Qualifications	Acceptance Criteria
Offshore medical/Physical	Current valid Certificate
Offshore Water survival /HUET course applicable for geographical area of work	Current valid certificate of completion
Health, Safety & Environment training courses applicable for geographical area of work	Current valid certificate of completion
	Issued Employee ROV Personnel Competency Program book (Log)
Complete Introduction To ROV training	Pilot/Technician Level 2 Certificate

COMPETENCY TASK ASSESSMENT RECORD

ROV Pilot/Technician Level 1

SAFETY AWARENESS

001

	Task	Tasks to be performed	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
	PT1.1.1a	Demonstrates awareness of local regulatory Requirements	<input type="checkbox"/>			
	PT1.1.1b	Demonstrate the ability to recognize , report and correct unsafe behavior	<input type="checkbox"/>			
	PT1.1.1c	Demonstrates an awareness of the importance of safety in the work place including the hazards associated with confined spaces and best industry practices toward the environment	<input type="checkbox"/>			
	PT1.1.1d	Demonstrate an understanding of the various types of energy within the industry, eg High voltage, high pressures, stored energy, chemical, mechanical	<input type="checkbox"/>			
	PT1.1.1e	Demonstrate the ability to locate Safety equipment onboard ROV system	<input type="checkbox"/>			

OPERATIONAL COMPETENCY

002

	Task/Priority	Tasks to be performed	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
	PT1.2.1a	Demonstrates the ability to read Hydraulic or Electrical schematics	<input type="checkbox"/>			
	PT1.2.1b	Demonstrates the ability to communicate and follow a pre dive check list of all ROV operational systems	<input type="checkbox"/>			
	PT1.2.1c	Demonstrates the ability to compensate the hydraulic system	<input type="checkbox"/>			

PILOTING SKILLS/NAVIGATIONAL ABILITY

003

Task/Priority		Task to be performed	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
		Demonstrates the ability to communicate effectively to the pilot and guide the pilot to a selected target				
		Demonstrates the ability to hold the ROV heading				
		Demonstrates the ability to hold station mid water				
		Demonstrates the ability to fly ROV to target focusing on altimeter, and tether management				
		Demonstrate the ability to operate the Sonar system on the ROV				
		Demonstrates understanding/familiarity with the sonar operations and interpret a sonar image.				
		Ability to enter and exit a Tether Management System (TMS), either cage or top hat system				
		List at least two types navigational added on the ROV system				
		Demonstrate the proper usage of the tether control circuit and proper use of manage tether management				

Task/Priority		Test, Maintain and Operate ROV system under supervision (Continued)	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.5.1b		Perform a deck pre and post dive check under supervision				
PT1.5.1d		With Supervision, demonstrates knowledge of working and energizing equipment				
PT1.5.1e		Demonstrates ability to identify major energy hazards on the ROV system, and what associated isolations are required for each				
PT1.5.1f		Demonstrate and differentiate between a Rate and Spatially corresponding manipulator				
PT1.5.1g		Demonstrate the operation, purpose and hazards involved with the MG van Knife Switch				
PT1.5.1i		Identify major components in the video circuit from sea to surface and the flow of the video				
PT1.5.1j		Demonstrate the ability to re-route video signals on the video switcher in navigators console				
PT1.5.1k		Determine what sensors are typically associated with vehicle depth, distance above sea floor, water temperature and heading				
PT1.5.1l		Identify major components in the fiber optic portions of the system				
PT1.5.1m		Shows a conceptual understanding of the basic flow of system power, telemetry and hydraulic flow paths through visual and verbal tracing				
PT1.5.1n		Locate system generator and explain why we use this when facility power is not a clean steady source of supply				
PT1.5.1o		Demonstrates an understanding of what telemetry is				
PT1.5.1p		Demonstrates understanding of the difference between Rate controlled and Spatially Correspondent controlled manipulators				
PT1.5.1q		Determine what sensors are typically associated with vehicle depth, distance above sea floor, water temperature and heading. Point out the location of each of these components as they are mentioned				

Task/Priority		Awareness of preventative maintenance requirements	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.6.1a		Demonstrates understanding of the importance of a fresh water rinse down on the umbilical during recovery				
PT1.6.1b		Demonstrate understanding of the importance of closely monitoring and taking appropriate actions for water and ground fault alarms. This includes where the information is displayed				
PT1.6.1c		Demonstrate the proper inspection and maintenance of the systems communication equipment				
PT1.6.1d		Ability to determine how to effectively isolate the system for various levels of task				
PT1.6.1e		Demonstrates the ability to use typical system supplied test equipment and the use of hand tools				
PT1.6.1f		Demonstrate important aspects of performing an umbilical inspection and lubrication to detail the importance of preventative maintenance in regards to the umbilical				
PT1.6.1g		Locate the TDR and explain what it is used for as well as perform a battery check				
PT1.6.1h		Locate Oscilloscope and demonstrate its usage				
PT1.6.1i		Locate the OTDR and explain what it is used for as well as perform a battery check				
PT1.6.1j		Locate multimeter and explain use, ratings, safety concerns, and proper care to include storage of all ancillary equipment				
PT1.6.1k		Set multimeter up for: Voltage check, Resistance check, Current check and Continuity check while explaining the purpose for starting at the highest rated scale of the meter and adjusting lower after initial test				
PT1.6.1l		Demonstrate precautions that can be taken to prevent damage to cameras and lights				
PT1.6.1m		Demonstrates satisfactory troubleshooting techniques or approaches to problems				

	PT1.6.1n		Demonstrates understanding of a basic umbilical re-termination process				
	PT1.6.1o		Locate procedure for performing Ground Fault checks				
	PT1.6.1p		Perform a Lock out/Tag out (LOTO)for expected work on the umbilical				

	Task/Priority	Assists co-workers as required for maintenance needs	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
	PT1.6.2a	Demonstrates ability to retain information about maintenance issues by tracking them in the systems log books				
	PT1.6.2b	Determine the reason for performing hydraulic system air and water checks and perform them under supervision				
	PT1.6.2c	Demonstrate understanding of proper disposal procedures for hydraulic fluid contaminated water, rags, filters or any other environmentally hazardous contaminant.				
	PT1.6.2d	Identify the manufacturer of the subsea light and locate literature to accompany it				
	PT1.6.2e	Demonstrate ability to properly remove and replace camera units under supervision and show how cameras can be focused and zoomed from surface				
	PT1.6.2f	Identify the manufacturer and type of cameras on the system and explain the hazards in performing maintenance on camera assemblies				
	PT1.6.2g	Assists in preparing work area for tasks as well as assist technicians in the basic needs relating to the maintenance				
	PT1.6.2h	Perform a subsea light lamp replacement while demonstrating proper methods and understanding of the hazards involved				
	PT1.6.2i	Demonstrates willingness to actively participate in maintenance needs				

SAFE OPERATING TECHNIQUES

007

Task/Priority		Knowledge of safety and operating requirements during Launch and Recovery operations	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.7.1a		Understand the ROV team members roles and responsibilities during a system Launch and recovery operations while under supervision				
PT1.7.1b		Demonstrates understanding of how environmental conditions effect the launch and recovery of a system				
PT1.7.1c		Demonstrates FULL understanding of the operation and safety concerns for the ROV system winch				
PT1.7.1d		Demonstrates proper communication procedures during ROV operations and provides both a valid and invalid example of communication procedures				
PT1.7.1e		Operate the LARS safely and under close supervision				
PT1.7.1f		Able to describe the unique differences and safety concerns with fixed A-frame, docking head, cursor, guide wire and rail LARS operations				

Task/Priority		Knowledge of safety and operating requirements during Launch and Recovery operations (Continued)	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.7.1g		Demonstrate understanding of the limitations and hazards of operating system lights and subsea motors while on deck or during transition to sea surface				
PT1.7.1h		Demonstrates understanding of the role of each crewmember during a launch and recover operation				

PILOTING SKILLS/NAVIGATIONAL ABILITY 008

Task/Priority		Basic Knowledge of sonar operation	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.8.1a		Demonstrate the ability to communicate effectively to guide the pilot to a selected target				
PT1.8.1b		Demonstrate an understanding/familiarity with sonar operations and the ability to interpret a sonar image				
PT1.8.1c		Demonstrate the ability to interpret a sonar image				
PT1.8.1d		Locate the sonar on the ROV and explain its basic operation				
PT1.8.1e		List at least two types of common acoustic equipment used on the ROV and how they assist with navigation				
PT1.8.1f		Guide pilot to assessor selected target				

ADMINISTRATION 009

Task/Priority		Basic knowledge of paperwork created or filled in on paperwork computer	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.9.1a		Shows understanding of how to effectively navigate and use programs such as word processing and spreadsheeting				
PT1.9.1b		Perform a file save/backup task on the paperwork computer				
PT1.9.1c		Demonstrates basic knowledge of operating computer system and its uses in daily operations				
PT1.9.1d						

Task/Priority		Knowledge of proper log keeping requirements	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.9.2a		Understands importance of good record keeping skills				
PT1.9.2b		Identify the specific uses of all logbooks on the system				
PT1.9.2c		Complete a Pre-Post dive log entry in the system logbook under supervision				
PT1.9.2d		Provides proof of understanding and reasoning on how information exchange plays a vital role in operational success				
PT1.9.2e		Demonstrate the ability to record dive information onto the dive log				
PT1.9.2f		Demonstrates the ability to record video information onto media				

TECHNICAL ABILITY 010

Task/Priority		Basic knowledge of fundamental ROV hydraulic systems	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.1a		Identify the type and quantity of hydraulic fluid used on the entire system including the winch				
PT1.10.1b		Identify size and pressure rating of a hydraulic hose as well as proper installation of a hose				
PT1.10.1c		Determine why hose routing and hose security is critical				
PT1.10.1d		Demonstrate proper hose and fitting inspection as well as discuss proper care and storage of these items				
PT1.10.1e		Ability to identify major components on a typical ROV hydraulics layout as well as identify various types of hydraulic fittings				
PT1.10.1f		Locate Swagelok tools and explain the proper method for making up a fitting and installing the fitting on the system				
PT1.10.1g		Determine what fitting would PTFE (thread tape) be used on				
PT1.10.1h		Locate a Quick Disconnects on the system				
PT1.10.1i		Demonstrate understanding and importance of ROV hydraulic compensation circuits (comps)				

Task/Priority		Basic knowledge of fundamental ROV hydraulic systems (Continued)	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.1j		Locate major components and trace out 2 compensation circuits				
PT1.10.1k		Demonstrates understanding of how to differentiate between high and low pressure fittings				
PT1.10.1l		Locate tooling valve packs and thruster control valve packs				
PT1.10.1m		Demonstrate ability to identify basic hydraulic symbols				
PT1.10.1n		Provide examples of proper and improper hose routing on the system and why they are such				
PT1.10.1o		Locate the placement of all hydraulic monitoring gauges on the winch, cage and vehicle				

Task/Priority		Basic knowledge of fundamental ROV electrical and electronics and fiber systems	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.2b		Demonstrate the ability to replace a power supply				
PT1.10.2c		Demonstrate understanding of location and safety awareness as well as proper handling/isolating of various power supplies in the system				
PT1.10.2d		Determine and prove understanding of standard colors or markings use for ground wires in most electrical cables				
PT1.10.2e		Ability to identify major components on a typical ROV electrical layout and their purpose to include isolation methods in the event of an accident				
PT1.10.2f		Properly test a fuse and explain their function in a circuit as well as how to determine the rating of one				
PT1.10.2g		Locate all Line Driver boards on the system. Identify both sides of one of them by protocols and power requirements				
PT1.10.2h		Prove understanding of the purpose behind Ground Fault Circuits on the system and what they are monitoring				
PT1.10.2i		Locate fiber optic connectors and re-termination kit in spares van				
PT1.10.2j		Locate information regarding fiber connector installation and discuss the basic process to terminate a fiber optic cable using current system methods				
PT1.10.2k		Define basic grounding principles and hazards of not doing so and then properly ground the Subsea package to the Rig/Vessel or other supporting structure				

Task/Priority		Basic knowledge of fundamental ROV electrical and electronics and fiber systems (Continued)	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.2l		Determine how subsea motors are monitored for runtime				
PT1.10.2m		Locate a Ground Fault Interrupt circuit on the system				
PT1.10.2n		Ability to identify major components on a typical ROV electronics/sensory layout and their purpose				
PT1.10.2o		Demonstrate ability to identify basic electrical and electronic symbols				
PT1.10.2p		Draw a block diagram of the basic electrical power flow on an entire ROV system				

Task/Priority		Basic knowledge of ROV system components	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.3a		Properly removing and connect a subsea connector while describing key points such as keyways, torque, cross-threading and O-ring topics				
PT1.10.3b		Locate where water alarm sensors are located and where the information from these sensors is displayed				
PT1.10.3c		Demonstrates basic troubleshooting techniques and uses ideal sequences of investigation to fix problems				
PT1.10.3d		Simulate troubleshooting steps to be taken given a particular problem with the system as conceived by the assessor. (Hypothetical scenario)				
PT1.10.3e		Identify subsea tools such as soft line cutter, hard line cutter, trash pump, AX gasket tool and simple torque tools				
PT1.10.3f		Locate information pertaining to subsea ROV tooling and assist in tooling maintenance				
PT1.10.3g		Prove understanding of NTSC and PAL video standards				
PT1.10.3h		Draw a diagram of the construction of a fiber and non-fiber tether				
PT1.10.3i		Locate O-ring sizing tool and demonstrate how it works				
PT1.10.3j		Draw a diagram of a common umbilical structure				
PT1.10.3k		Assist in performing a subsea potting operation and observe a connector being soldered and whip being built				

Task/Priority		Basic knowledge of ROV system components (Continued)	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.10.3l		Demonstrate understanding of cable PBOF needs on the system				
PT1.10.3m		Demonstrate how to construct a short whip for connecting pilot computer to either cage or vehicle computer and describe the benefits of this "troubleshooting tool"				
PT1.10.3n		Locate several anodes on the system and discuss the purpose of anodes as well as proper installation and maintenance of them				
PT1.10.3o		Demonstrate proper O-ring removal, inspection, lubrication and installation				

MISCELLANEOUS 011

Task/Priority		Basic knowledge of various topics relating to ROV's or the industry	Check box if Deemed Competent	Date m/d/yy	Assessor Initials	Assessor Number
PT1.11.1a		Determine several applications for which ROV's are used by company				
PT1.11.1b		Demonstrate ability to identify subsea structures/products and any associated acronyms (Example: TLP, BOP, THS, UTAJ, HCS)				
PT1.11.1c		Demonstrate the importance of customer expectations and goals				