“GOT Training?”

(**G**oals / **O**bjectives / **T**est Items)

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SYNOPSIS

In view of the fact that the mission of technical training is "to bring each performer to certifiable competence in the shortest time at the lowest cost, and then maintain that competence," it pays to view it with very systematic focus.

Moving from Goals, to measurable performance-oriented Objectives, to specifically linked Test Items, this presentation will enable the training professional to see the difference between delivering to the organization predictably high productivity from each performer and just doing conventional training.

Goals

- State what tasks the performer will be paid to perform.

Objectives

- Determine how they could demonstrate that they can perform those tasks.

Test Items

- Determine, specifically, what you will have them do in order to demonstrate that they can perform those tasks.

INTRODUCTION

When this proposed system of Goals, Objectives, and Test Items is effectively employed in a training program the **results** of that training program are "**locked in**." This will happen regardless of the course design or materials, and regardless of the characteristics of the instructor.

On the other hand if this system of Goals, Objectives, and Test Items is not employed in a training program the results of that training program are not "locked in." They will depend entirely on the course design, materials, and the characteristics of the instructor. The course duration will also tend to be much longer.

The only real variables in this approach, then, are the duration of the course and the cost of the course. This is because the success of the course is defined entirely by the achievement of the objectives. The training continues until the objectives are met, and then it stops.

You can still increase the "appeal" of the course, and you can further decrease the duration and cost of the course, but its effectiveness is assured in advance. This is true as long as the objectives are clear, and as long as they truly represent the tasks that are to be performed by the employee, on the job.

GOALS

☆ Goals express the ability to perform a certain job task.

- Ask, “What do I want the learner to be able to do?”
- And, “Why do I want the learner to achieve this goal?”

- A Goal is a statement describing something that is considered important to achieve, but is not actually measurable; it does not answer the question, “How will I know one when I see one?”
  - It will have to be converted into a performance, something that is directly visible or otherwise assessable, when it is to be turned into an Objective.
  - The Goal tells the learners what they must know, or be able to do, but they do not know yet exactly how they will be expected to demonstrate their attainment of it.
- Examples:
  - Perform system initialization and shutdown.
  - Perform system setup.
  - Adjust the phase of the incoming wave to match that of the reference wave.
  - Select the appropriate tools to use for a particular alignment process.
  - Identify the difference between normal and abnormal states of operation.
  - Perform troubleshooting in the system when common problems occur.
  - Understand the functions of the operator assists during system operation.
  - Understand the hardware and software response indicators.
  - Respond appropriately to the hardware and software response indicators

OBJECTIVES

☆ Performance Objectives describe exactly what the trainees must do in order to demonstrate that they have acquired the identified skills.

☆ Objectives are measurable statements of intent.

- “What will I take as evidence that my Goal has been achieved?”
  - The Objective provides that evidence.
- At what point will I be willing to certify someone as having attained that goal?
  - At the point that I see the activity called for in the Objective.

☆ The doing must be observable, so you must devise a way to make it observable.

- Example:
  - Goal: "Know the functions of the controls and indicators." (Not Observable.)
  - Objective: "State (or write) the functions of the controls and indicators." (Observable.)
- If you are not sure how to make the ability visible, ask yourself how you would identify a non-competent performer. Look for job tasks that someone could perform incorrectly. Then write objectives for those tasks.
  - "But how many tasks, and which ones?"
    - Each task must be important enough to warrant the time and effort.

☆ You are looking for the <u>presence</u> or <u>absence</u> of an ability.

- What must the person be able to do, under what conditions, and how well?

☆ When the Objectives clearly specify the competencies to be acquired this results in two significant benefits for the instructor and student:

- They both know what results to look for.
  - The learners may even be able to achieve those results quickly *on their own*.
- They both know how close the learner is to accomplishing those results.
  - The instructor can quickly re-engineer the learning experiences and rates of coverage to best close any gap in their performance.
- After evaluating the performance the instructor either signs-off the Objective or assigns remedial training.

- Objectives bring in to view, exactly what the learner can or cannot <u>do</u>, independent of the performance of others.
  - If some of the people can perform far better than their peers, but are still unable to perform to a specified criteria this is not worthwhile to the business. This would be considered "Norm-referenced" training.

    If one person is the least competent of a group, but is fully able to perform the specified task it doesn't really matter how they compare to the rest of that group.
- Use knowledge objectives only if the performer would not be able to perform a particular job task without that knowledge.
  - Remember that a knowledge objective must be made <u>visible</u>.

GOALS AND OBJECTIVES EXAMPLES

Practice Exercise:

Place a "**G**" by the acceptable "Goals".

Place an "**O**" by the acceptable Objectives".

Place an "**N**" by the ones that are neither.

__ Discuss the hazards of RF circuits to humans.

__ Describe different types of transmission lines and their use.

__ Determine the acceptable or unacceptable condition of an anode and cathode by inspection.

__ Clear/troubleshoot out of phase errors.

__ Replace the thermocouple.

__ Construct and test simple PMOS and/or NMOS field effect transistor devices.

__ State Moore's, Law and discuss how it influences the need for trained technicians.

__ Discuss four states of matter. Include plasma.

__ Name the key parts and functions of bipolar transistors.

__ List the key factors that determine oxide thickness.

__ Discuss various errors and problems associated with photolithography.

__ List four major types of contamination that can occur on wafer surfaces.

__ State two ways to remove unwanted oxide layers from wafer surfaces.

__ Discuss compressed gasses and the affiliated chemical and mechanical hazards. Include safety information on the storage, handling, tagging, coding, disposal, separation, and use of compressed gases, cylinders, and valves.

__ Demonstrate understanding of requalification for process after calibration is performed.

__ Perform a system failure recovery.

__ Access and use diagnostic programs.

__ Demonstrate an understanding of system process control.

__ Perform an emergency power down operation.

__ Demonstrate the ability to use all technical manuals and drawings.

__ Run the manual align / auto step function.

__ Replace the waveform generator injection probe.

__ Understand the steps normally followed to measure frequency drift.

__ State what gain and offset settings to use when troubleshooting the system.

__ Name the two types of alarms that are present on the signal injection module.

TEST ITEMS

☆ The Test Item requires the learner to perform what the objective specifies, under the conditions stated in the objective.

- Goal: Know ohm's law.
- Objective: Be able to state ohm's law.
- Test Item: State (or write) ohm's law.

- A Test Item can simply ask the learner to do precisely what the Performance Objective said he should be able to do on a one to one basis.
  - Goal: Be able to restrain a class 1A patient to a litter and prepare him for aeromedical evacuation.
  - Objective: Using equipment provided, restrain a simulated class 1A patient to the litter and prepare him for aeromedical evacuation.
  - Test Item: Using the equipment provided, restrain the simulated class 1A patient to the litter and prepare him for aeromedical evacuation.
- When the objective indicates performance, that objective must be measured by performance.
  - Goal: Be able to enter and leave a contaminated area safely.
  - Objective: Given a simulated contamination area, demonstrate the ability to safely enter and leave it.
  - Test Item: Observing all safety precautions, enter and leave the simulated contamination area.
- If not yet competent, the learner is expected to practice until the criteria can be met.
- Written Tests
  - Written test answers that may be incomplete can be returned to the learner for correction until they meet the specified standards.
  - Multiple choice items and True/False items practically never tell you whether your objectives have been actually achieved.
    - Whenever possible convert them to open-ended or fill-in-the-blank questions.
  - Examples: (These were originally written as multiple choice items.)
    - While removing a cassette of wafers from a lot transfer box, you notice dust particles and flakes inside the lot transfer box. What should you do?
    - What should you do if a wafer mass transfer tool (auto cassette to cassette) is not working correctly?
    - Sensitivity parameters and filter sets are found in the _____ mode.
    - Name the two methods by which magnification can be changed.

- The only place that multiple choice test items may be appropriate is where the objective asks the performer to recognize an item from among a group of other items. (Don't forget that this objective must relate directly to a job task.)

- Which of the following is an example of a defect?
  - A. Scratch
  - B. Flake
  - C. Particle
  - D. Chip
  - E. All of the above.

- Which people do wafer handling and cleanroom procedures apply to?
  - A. MT's and Engineers
  - B. Visitors only
  - C. Suppliers and contractors
  - D. All personnel within the cleanroom

- Troubleshooting abilities can be very well evaluated by written Test Items because they are always looking for a judgment ability.
  - Because of this don't just require them to troubleshoot one or two problems injected into the equipment.
    - In this method a lot of time is consumed in the lab for a performer to demonstrate the troubleshooting of one (and that means only one type) of equipment failure mode.
    - You will find yourself watching them use a DVM, tools, oscilloscope, etc. And if they already have demonstrated the competence in using these devices you will waste a lot of time just watching them repeat those same competencies over and over again.
    - That time can be better used by using a higher number of simulated (written) Test. These items call for judgment, which is exactly what you are really looking for in troubleshooting ability.
    - Examples:
      - Upon power up the robot arm swings fully clockwise. How would you begin troubleshooting this problem?
      - Manual align works, but Auto Step mode does not. How would you begin troubleshooting this problem?
      - You discover that LED 4 and LED 5 are lit, but LED 6 is not. What would this indicate?
      - How would you determine whether or not the thermocouple works properly?

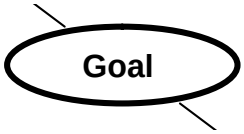
SUMMARY

Defining Success

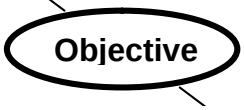
☆ ***The training program can be judged a success when it delivers the productivity in the performer that the performer's work center needs, and in fact will be paying them to perform.***

- **In order to make this success happen everything must point to, and be derived from a Job Task.**

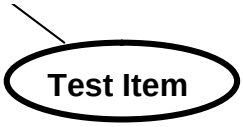
Make sure that your Goal is derived directly from a Job Task.



Make sure that your Objective is derived directly from a Goal.



Make sure that your Test Item is derived directly from an Objective.



APPENDIX A: A Three-Step Method for acquiring Performance Objectives from an operational procedure.

Step One: Copy and Paste the text of the procedure into a word document.

- This is a copy of the "SAFE DELIVERY SOURCE TEST PROCEDURE":

(The shaded items will be removed in Step 2.)

1. Make Plumbing and Electrical connections

1.1 Make the plumbing and electrical connections as shown in Figure 1 of the procedure QAP-003-0009.

1.2 Connect the URS20P cable to the UPT.

1.3 Connect the Data Cal "MFC 1" cable to the SDS unit under test.

2. Vacuum Pump-down

2.1 Turn the DataCal on, press F3 for Dynamic mode, and press A for Active Readouts.

2.2 At the Datacal enter a 200% setpoint.

2.3 Turn Exhaust On; Gas On; Valve On.

2.4 Turn the URS-20 Power Supply on.

2.5 Turn the PDR-C-2C Readout on.

2.6 Turn the Vacuum Pump on.

2.7 Turn the shut-off valve on to pull vacuum from the UPC to the exhaust.

Note: You may find it an advantage to start out with the shut-off valve off. This may shorten the pump-down time. When the Readout display lights turn the valve on, as specified in this step (2.7).

2.8 Switch the URS20P to the "Set" position.

3. On the VTP/Pressure Limit Form, record the S/N, Gas, and Range of the SDS unit.

4. Preliminary Test

4.1 At the Datacal enter a 100% setpoint.

4.2 Adjust the URS20P to 1.5V.

4.3 Ensure that the pressure readout indicates 15 Torr.

4.4 Ensure that the VTP value is less than 9VDC. If it is not return it to the Tuner, and instruct the Tuner to adjust the stack-up of the valve accordingly.

5. Final Test

5.1 At the Datacal enter a 100% setpoint.

5.2 Adjust the URS20P to 10.0 VDC

5.3 Ensure that the pressure readout indicates 100 Torr.

5.4 Record the VTP value on the VTP/Pressure Limit form.

5.5 At the Datacal enter a 50% setpoint.

5.5.1 Adjust the URS20P until the Pressure readout indicates 100 Torr.

5.5.2 Record the VTP value on the VTP/Pressure Limit form

5.6 On Datacal enter a 25% setpoint.

5.7 Adjust the URS20P until the Pressure readout indicates 100 Torr.

5.8 Record the VTP value on the VTP/Pressure Limit form

5.9 Repeat Steps 8.2 through for 90,80, 70, 60, 50, 40, 30, 20, 15, 10, and 5 Torr, respectively.

5.9.1 Adjust the URS20P for each of the pressure values above.

5.9.2 Record VTP values for 100%, 50%, and 25% for each pressure value above.

<u>Step Two:</u> Select the statements that identify a new skill or ability.

- Remove the items (shown shaded) which describe the basic skills that the performer already has and any duplications of skills.

<u>Step Three:</u> Transfer the Statements to the Performance Objectives form.

- The form includes a numbering sequence, check mark lines, references, and sign-off boxes.

SAFE DELIVERY SOURCE TEST PROCEDURES
PERFORMANCE OBJECTIVES

PERFORMANCE OBJECTIVES	REFERENCES	PERFORMER Init. and Date	CERTIFIER Init. and Date
1.0 Preliminary			
__ 1.1 On the VTP/Pressure Limit Form (QCD-001-0062), record the S/N, Gas and Range of unit.	SDS Test Procedure QAP-003-0009 A		
2.0 Make Plumbing and Electrical Connections			
__ 2.1 Make the plumbing and electrical connections as shown in Figure 1 of the procedure QAP-003-0009.	SDS Test Procedure QAP-003-0009 A		
__ 2.2 Connect URS20P cable to UPT.	SDS Test Procedure QAP-003-0009 A		
__ 2.3 Connect MFC 1 cable to UFC under test.	SDS Test Procedure QAP-003-0009 A		
3.0 Vacuum Pump-down			
__ 3.1 Turn URS20 Power Supply on.	SDS Test Procedure QAP-003-0009 A		
__ 3.2 Turn MKS PDR-C-2C readout on.	SDS Test Procedure QAP-003-0009 A		
__ 3.3 Turn Vacuum Pump on to pull vacuum.	SDS Test Procedure QAP-003-0009 A		
__ 3.4 Turn shut-off valve on to pull vacuum from UPC to exhaust.	SDS Test Procedure QAP-003-0009 A		
__ 3.5 Switch URS20 Power Supply to Set position.	SDS Test Procedure QAP-003-0009 A		
4.0 Preliminary Test			
__ 4.1 Adjust URS20 Power Supply to 1.5V, and ensure that pressure readout is 15 Torr.	SDS Test Procedure QAP-003-0009 A		
__ 4.2 State what to do if the VTP value is less than 9VDC.	SDS Test Procedure QAP-003-0009 A		

PERFORMANCE OBJECTIVES	REFERENCES	PERFORMER Init. and Date	CERTIFIER Init. and Date
5.0 Final Test			
__ 5.1 Adjust URS20 Power Supply to 10.0 VDC	SDS Test Procedure QAP-003-0009 A		
__ 5.2 Ensure that pressure readout is 100 Torr.	SDS Test Procedure QAP-003-0009 A		
__ 5.3 Record VTP value on VTP/Pressure Limit Form.	SDS Test Procedure QAP-003-0009 A		
__ 5.4 Adjust URS20 Power Supply until Pressure readout is 100 Torr.	SDS Test Procedure QAP-003-0009 A		
__ 5.5 Repeat Steps 8.2 through for 90,80, 70, 60 , 50, 40, 30, 20, 15, 10, and 5 Torr respectively. __ 5.5.1 Adjust URS20P for each of the pressure values above. __ 5.5.2 Record VTP values for 100%, 50% and 25% for each pressure value above.	SDS Test Procedure QAP-003-0009 A		

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About Skip Welles

Skip began his career installing and servicing radiation therapy and diagnostic ultrasound imaging equipment for Varian Associates (currently Varian Medical Systems). Subsequent to that, he served as a field service trainer for Varian Medical Systems, Philips Medical Systems, and Toshiba America Medical Systems.

For 14 years he was a one-person training department for Celerity Inc., a provider of chemical gas flow control equipment for semiconductor manufacturers. U.S. Navy schools prepared him for his career in electronics and he served as a U.S. Navy Instructor.

He has demonstrated the ability to cut training course length from 30% to 50%, using Criterion Referenced Instruction techniques, and considers CRI to be the most effective and cost effective approach to training development. He believes that it can greatly boost the effectiveness of any training organization. CRI can be explored further at www.cepworldwide.com.