



# Dimensions

**Schroeder Measurement Technologies, Inc.**

2494 Bayshore Boulevard, Suite 201, Dunedin, FL 34698

Phone: (800) 556 0484 or (727) 738 8727

www.smttest.com

**SMT NEWS**

**SMT Enters a New Dimension**



Schroeder Measurement Technologies (SMT) has grown significantly over the past few years, and now that growth has propelled us forward into even more office space, as well as new technologies and systems, which include a new telephone system, new T1 lines, and an updated network system. Also, new computer driven printing presses have replaced older technologies, which enables a more streamlined exam booklet and document manufacturing process.

In January of 2002 it became apparent that we were going to outgrow the current office space in the near future, so the

company's president and vice president, Lee Schroeder and Matt Wenger, began searching for solutions. Because of the large amount of equipment and the large number of people that would be affected, the decision was made to expand into a vacant space within the current building. This new space is connected to the existing space, and adds nearly 3,000 square feet.

Currently, the Test Administration Department uses this new space, while Management Information Systems, as well as the Business Development, Accounting, Test Development, and Research and Development Departments have expanded within the existing space.

The Business Development Department is the newest department at SMT, and its sole purpose is to seek out and develop relationships with potential customers. Dick Soule, a veteran of the testing industry, is director of the department, and although it has only been operational for six months, the Business Development Department is already proving SMT's advantages to new customers.

Once the new office space was added, and the new department was formed, it was time to upgrade the communication technology. This upgrade included new T1 lines for data transmission and a new digital telephone network, which will better serve SMT clients and staff.

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Using the new digital telephone network, telephone calls are automatically routed to the next available operator. This has resulted in a more uniform workload among operators, and has virtually eliminated the need for callers to wait to be connected. Other features available with the system are telephone reports, which give the network administrator important information to help identify and eliminate communication bottlenecks.

After installing the new digital telephone network, SMT added new T1 data lines. The new T1 lines offer SMT faster information and data exchanges both with clients and candidates. These T1 lines enable Internet connectivity at speeds up to 2.5 Gbps, making data transfers much more efficient. In addition, new firewalls were installed and new encryption technology was implemented company wide. The new data encryption technology allows us to digitally sign our email correspondence, which ensures validity and prevents email spoofing. This new technology is enabling us to send more confidential material via email, which is faster and less expensive compared to a traceable courier.

To increase the efficiency of test booklet publishing, SMT

purchased two new computer driven presses to replace the aging press. When printing test booklets, the new machines no longer must scan the original document, as each is able to access and print the original document from our network. This system reduces the amount of time and paper used during the printing process.

We are now able to archive answer sheets in an electronic form (e.g. compact disc or hard drive) by now scanning each answer sheet using very high speed image scanning technology. Previously each answer sheet was physically stored off site, however, now that we are able to scan and store the answer sheets electronically, storage costs are reduced and access to archived documents is quicker and easier.

The past year has been one of upgrades and expansions; however, SMT is still growing ever larger. In the next year, we will open three new offices. One of these offices will serve as the Business Development Office, and will be located in the New York – Washington Corridor, while the other two offices will perform administrative functions for SMT’s international clients, and will be located in Hong Kong and London.

SMT’s goal is to provide each client with an unparalleled “personal” relationship, aimed at meeting each client’s unique needs, while offering competitive prices through technology and innovation. In 2002, SMT has invested significant resources which will pay off for our clients through enhanced services and even more competitive costs.

## JOB ANALYSIS STUDIES

### Algorithmically Derived Examination Specifications

One of the most important components of a legally defensible examination program is a job analysis study. This article describes a procedure SMT incorporates to develop final test specifications for an examination program. These specifications include testing mode (e.g., multiple choice test, performance, or essay test) and the relative weighting of content area for subsequent assessment.

*The Standards for Educational and Psychological Testing (1999) provide guidance on the establishment of test specifications for credentialing examinations:*

*The content domain to be covered by a credentialing test should be defined clearly and justified in terms of the importance of the content for credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted. (Standard 14.14)*

In general, a job analysis is a study of the important tasks associated with a professional role. Using a survey-based methodology helps generalize the results of the study. SMT uses algorithmically generated information to facilitate decisions on testing type and relative content area weighting. For the purpose of this article and example, the discussion is limited to one rating scale type, the importance scale. However, we typically use multiple rating scales during our studies.

Test specification design should incorporate important tasks that

data from a job analysis support. It is this link that helps establish a validity claim or link between test score inferences and the occupation. This data typically comes from the judgments of hundreds or thousands of professionals who complete a task analysis survey.

An argument can be made that relative importance of certain content, as provided by mean importance ratings should be included in the decision of how to weight certain areas of a content outline.

The following discussion presents a three-step process that describes our procedure for delineating content and assigning content weights. In addition, the process helps credentialing organizations decide how to weight different examination form types.

### **Step 1: Determine Eligible Content**

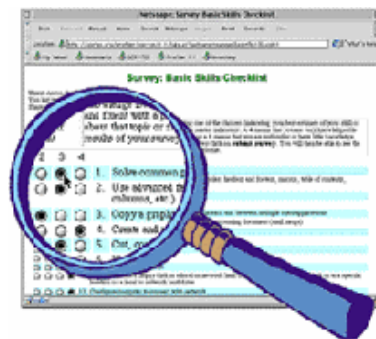
Determine what work-related tasks are to be included in the survey by conducting an exhaustive review of curriculum and other work-related documents. Then, a panel of Subject Matter Experts (SMEs) is convened to develop a task list based on the review. Next, the task list is incorporated into a survey, demographic questions for subsequent analyses are developed, and the

survey is distributed to a representative sample of practitioners.

After the survey has been administered and data has been tabulated, decisions about task inclusion and exclusion should be made based on mean task ratings. Below is an example of some fictitious data describing this step. Relative mean importance ratings are used to determine what content becomes eligible for assessment. The scale in this case is:

How important is this activity to the successful performance of the professional?

1. Minimum Importance
2. Below Average Importance
3. Above Average Importance
4. Maximum Importance



**Table 1, Eligible Content**

Content Area	Mean Importance Rating	Task Included in final outline?
A)	2.56	1
<b>B)</b>	<b>2.49</b>	<b>0</b>
C)	2.67	1
D)	2.98	1
E)	2.75	1
A)	<b>2.41</b>	<b>0</b>
B)	2.65	1
C)	2.85	1
D)	2.98	1
E)	3.01	1
F)	2.78	1
G)	2.85	1
A)	3.28	1
B)	3.45	1
C)	3.89	1

Tasks 1B and 2A in *Table 1* would be excluded from the final examination content outline. The criterion is deliberated and set by the panel of SMEs. The rationale for task exclusion in this sample is that the mean importance rating was below 2.50 (i.e, average importance based on the scale). All other tasks remain eligible for assessment.

### Step 2: Determine what type of assessment should be used

During this phase of specification development, a panel of SMEs determine what testing modality should be incorporated. For the purpose of this example, it is assumed that the credentialing agency has decided that three types of assessment will be used. After discussing what types of knowledge may be measured by various assessment modes, the panel of SMEs reviews the eligible tasks to

determine what assessment type or what type of knowledge should be measured. In this example, the three assessment types are 1) multiple choice examination, 2) performance assessment, and 3) essay examination. During step one, tasks 1B and 2A were eliminated so SMEs will not place these tasks into any of the three categories.

As can be viewed in Table 2, task 2G that was eligible for assessment on all three-assessment types will not be

**Table 2, Assessment Type**

Content Area	Mean Importance Rating	Task Included in final outline?	On Multiple Choice Test?	On OSCE Performance Test?	On Essay Test?
1) A)	2.56	1	1	0	1
<b>B)</b>	<b>2.49</b>	<b>0</b>			
C)	2.67	1	1	0	1
D)	2.98	1	1	0	1
E)	2.75	1	1	0	1
2) A)	<b>2.41</b>	<b>0</b>			
B)	2.65	1	1	1	0
C)	2.85	1	1	1	0
D)	2.98	1	1	1	0
E)	3.01	1	1	1	0
F)	2.78	1	1	1	0
G)	2.85	1	0	1	0
3) A)	3.28	1	1	1	1
B)	3.45	1	1	1	1
C)	3.89	1	1	1	1

included on multiple-choice examination. The SMEs indicated that content area 1 is not eligible for assessment on the performance test, and content area 2 is not eligible for assessment on the Essay. SMT is considering the use of an assessment type scale on future surveys. After determining what is eligible for assessment by examination type, the next step is to determine how examination weights should be distributed by content. Since this defines all future examinations, it is a very important step

**Step 3: Determine content weighting (how many questions or prompts from each content area should be on each assessment type?)**

As indicated at the beginning of this article, the example provided is limited to an importance scale. Content weighting should be assigned based on relative importance. To that end, we have incorporated an algorithm to help SMEs deliberate content weights. These calculations for our sample are shown in Table 3.

Content weights are based on the sum of the mean importance ratings for a given area divided by the sum of all eligible mean importance ratings.

**Final Specifications:**

Content Area	Multiple Choice	OSCE	Essay
1)	30%	XX	51%
2)	40%	62%	XX
3)	30%	38%	49%

The example presented in this article is simplistic. There may be instances where multiple rating scales (frequency and importance) need manipulation to create one composite score for analyses. The data used during these meetings are used to facilitate SME decisions. While the data is based on a large cohort of respondents, minor adjustments to the final specifications can be made if an SME panel can articulate a defensible position for such modifications.

In summary, we use job analysis data to delineate examination specifications. It is anchored to a large sample’s perceptions of what they feel is important to the profession. In addition, SMT is incorporating a new continual model of Job Analysis. Look for more information about this in our next issue of Dimensions. For more information contact Reed A. Castle, PhD, SMT’s Director of Research and Development.

**Table 3, Content Weighting**

Content Area	Mean Importance Rating	Task Included in final outline?	On Multiple Choice Test?		On OSCE Performance Test?		On Essay Test?	
1) A)	2.56	1	1	2.56	0	0	1	2.56
B)	<b>2.49</b>	<b>0</b>						
C)	2.67	1	1	2.67	0	0	1	2.67
D)	2.98	1	1	2.98	0	0	1	2.98
E)	2.75	1	1	2.75	0	0	1	2.75
				10.96		0		10.96
				<b>30%</b>		<b>0%</b>		<b>51%</b>
2) A)	<b>2.41</b>	<b>0</b>						
B)	2.65	1	1	2.65	1	2.65	0	0
C)	2.85	1	1	2.85	1	2.85	0	0
D)	2.98	1	1	2.98	1	2.98	0	0
E)	3.01	1	1	3.01	1	3.01	0	0
F)	2.78	1	1	2.78	1	2.78	0	0
G)	2.85	1	0	0	1	2.85	0	0
				14.27		17.12		0
				<b>40%</b>		<b>62%</b>		<b>0%</b>
3) A)	3.28	1	1	3.28	1	3.28	1	3.28
B)	3.45	1	1	3.45	1	3.45	1	3.45
C)	3.89	1	1	3.89	1	3.89	1	3.89
				10.62		10.62		10.62
				<b>30%</b>		<b>38%</b>		<b>49%</b>

**SPOTLIGHT ON  
PEOPLE**

**Business Development  
Director:**

**Richard Soule**



SMT would like to welcome our newest senior manager, Mr. Richard M. Soule, as the Director of Business Development. He has joined SMT to develop a world-class sales and marketing organization serving SMT's current and future clients.

Dick received his Bachelor degree in psychology and education from Dartmouth College, and his Masters degree in education from the University of New Hampshire. He also completed doctoral studies in

***Business Development  
Director  
Richard Soule***

curriculum and supervision at Utah State University. He joins SMT from Assessment Systems, Inc. (ASI), where he served as Vice President of Business Development for nearly four years. During that time, he supervised sales professionals, a complete marketing staff, a large proposal development team, as well as account managers and test developers. Prior to joining ASI, Dick was Regional Vice President for CTB/McGraw-Hill, one of the largest school test publishers. With nearly 20 years of experience in the testing field, Dick is well-known in the field, having made presentations at professional conferences in both education and credentialing. He is well-versed in the full range of measurement issues, and specializes in communicating complex issues clearly and concisely. He is particularly knowledgeable in the area of computer-based testing (CBT), having been a user, developer, and representative during his career.

At SMT, Dick will help oversee the opening of an SMT office in the New York – Washington Corridor, which will allow us to better serve the many

professional and trade associations.

As a member of such organizations as CLEAR, NOCA, CompTIA, and ITC, Dick will continue his participation and looks forward to speaking with his many friends about the benefits SMT brings to the testing arena.

**F**or details about SMT, our product and service offerings, please contact:

**Richard Soule  
Business Development  
Director**

**Schroeder Measurement  
Technologies**

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## Schroeder Measurement Technologies, Inc

- ☑ Are you concerned about the security of your program?
- ☑ Do you find it too expensive to keep your tests up to date?
- ☑ Do you need a powerful item banking system? Or one with more flexibility?
- ☑ One that is fully integrated with a test scoring system and doesn't carry huge monthly fees?
- ☑ Do you want more flexibility from your testing vendor?
- ☑ Do you wish you could gain more control over your testing program?
- ☑ Do you think you're too small to get what you want?
- ☑ Do you wish you could score your answer sheets on-site while still maintaining the security of your answer keys?
- ☑ Is your vendor long on promises but short on performance?

SMT can help because we'll treat you like a number—Number 1.



Schroeder Measurement Technologies  
2494 Bayshore Blvd., Suite 201  
Dunedin, Florida 34698  
number1@smttest.com