

Project Title: Identifying Critical Middle-Skilled Positions and Career Pathways in the Upstream Oil and Gas Industry

Award Amount: \$138,265

Awardee: Houston Community College

Award Start Date: 09/01/15

Award End Date: 12/01/16

NAS Grant ID: 2000006005

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Project Key Personnel:

- N/A

I. ORIGINAL PROJECT SUMMARY (from proposal)

Houston Community College (HCC), along with the upstream oil and gas industry, industry associations and higher education partners, propose to:

1. Identify the most critical middle skills positions within the offshore oil and gas industry which have the potential to impact well operations safety
2. Identify and/or validate the knowledge, skills and abilities that lead to competence for the top three critical middle skills positions identified
3. Identify the career pathways leading to the top three critical middle skills positions
4. Create a curriculum for an incumbent field training program to prepare workers for promotion along one critical middle skills career pathway

Consortium partners include: Fletcher Technical Community College (LA), Jones County Junior College (MS), Lone Star College (TX), Louisiana Technical College-Young Memorial (LA), San Jacinto College (TX), University of Houston (TX), Association of Energy Service Companies, Ocean Energy Safety Institute, and International Association of Drilling Contractors (IADC).

Rationale for Proposal Innovation: Working through our industry association partners, the consortium proposes to identify the most critical middle skills positions impacting well operations safety. Heretofore, this identification task has not been completed for the Gulf of Mexico and this information is crucial to prioritizing the development of education and training programs that positively impact the safety culture of the oil and gas industry, reducing risk factors and mitigating the impacts of a Macondo-type incident.

Compared to the downstream oil and gas industry, the upstream and midstream sectors lag in efforts and resources committed to building nationally-standardized middle skills training programs targeting specific competencies required to perform the job. The IADC has recently updated their competency database for several rig positions. Unfortunately, the database does not yet include well service or operator positions; therefore, the consortium proposes to develop the competencies required for the top three middle skills positions identified and define the career pathways associated with each.

From this, the consortium will create a model for an incumbent field training program that combines on-the-job training with additional technical training. Currently, most institutions offer one or two stand-alone certificate or degree programs that address industry needs for entry-level rig crew members. Heretofore, institutions have not addressed career pathways; defining stackable credentials tied to various positions along career pathways is novel for this industry. This collaborative process between industry and education would define the competency gaps at each career level and facilitate curriculum development to address the gaps.

Relevance to Gulf Research Program Goals: This project primarily advances the Gulf Research Program through addressing "safety culture and environmental protection systems associated with offshore oil and gas development." Indeed, all four tenets of this proposal address the need for a stronger safety culture within the oil and gas industry. Positions will be ranked according to their potential impact of personnel and well operations safety. Critical positions identified will most certainly require knowledge, skills and abilities linked to safety. Moreover, the *raison d'etre* for the incumbent field training program is to develop a pipeline of safety-conscious, highly-skilled workers for safety critical positions within the industry.

II. PROJECT RESULTS

Accomplishments

The purpose of this project was to identify the most critical middle skills positions impacting well operations safety. Heretofore, this identification task has not been completed for the Gulf of Mexico and this information is crucial to prioritizing the development of education and training programs that positively impact the safety culture of the oil and gas industry.

The International Association of Drilling Contractors (IADC) has recently updated their competency database for several rig positions. Unfortunately, the database does not yet include well service or operator positions; therefore, the consortium proposes to develop the competencies required for the top three middle skills positions identified and define the career pathways associated with each.

This problem was addressed through four objectives with the following results:

Objective 1:

Identify the most critical middle skills positions within the oil and gas industry which have the potential to sustain well operations safety in the Gulf of Mexico.

Two industry summits were held on March 31, 2016 and April 7, 2016. Pre-survey responses, bowtie analysis facilitation and participant's votes were used to report data. The purpose of the summit was to

identify the most critical middle skills positions offshore that impact well operations safety. The Bowtie Major Accident Event (MAE) Analysis was employed utilizing the following MAEs:

1. Dropped Object;
2. Loss of Containment - Non-carbon Hydrocarbons;
3. Loss of Containment - Carbon Hydrocarbons;
4. Loss of Stability;
5. Rig Move Operations;
6. Station Keeping; and
7. Transportation - Ship Collision, Helicopter, and Vessel Impact.

The above MAEs were rated for both Drilling and and Production positions. As a result the following positions were rated as the top five for critical middle skill positions at risk for MAEs:

1. Barge Superintendent/Chief Mate
2. DPO/Ballast Control Operator
3. Rig Maintenance/Chief Engineer
4. Crane Operator
5. Driller

Objective 2:

Identify and/or validate the technical and non-technical knowledge, skills and abilities that lead to competence for the top three critical middle skills positions identified;

Of the top five critical middle skill positions identified from the Bowtie MAE Analysis, the competencies for Rig Maintenance Supervisor, Offshore Crane Operator, and Driller positions are not included in the IADC's updated competency database. For of these three positions we conducted "Developing A Curriculum" (DACUM) workshops, in August 2016 facilitated by the Ductwork Consulting Group, to define the knowledge, skills and abilities that lead to competence.

The DACUM process is a specialized occupational analysis often used by education institutions. The process assumes that subject matter experts are the best source for a job task analysis and that any occupation can be defined by its duties, tasks, knowledge, skills and abilities. During the process, six industry professionals served as the subject matter expert panel and worked with the facilitator during a two-day period to list the major duties of a job and the tasks required for each duty. The subject matter expert panel also identified the knowledge and skills required of successful workers as well as the equipment and tools used in the job.

As a result of this process a DACUM was developed for the three of the top five critical middle skill positions, Driller, Crane Operator, and Rig Maintenance Supervisor. This information is readily available in the DACUM chart which also has info on panel members, career progression, tools and equipment, future trends, and certification and regulations associated with each position.

UPDATE (1/27/17)- All DACUMs requiring validation have been validated. Upon review by the panel the DACUMs for Crane Operator and the Driller were approved and did not require additional validation.

Objective 3:

Identify the career pathways leading to the top three critical middle skills positions.

A Career Pathways Guide was developed for offshore middle skilled positions. The career profiles in this guide reflect the outcomes of the scientific bowtie analysis approach taken by representatives working in the offshore industry.

Within the guide, there are two types of information:

1. An overview of the offshore oil and gas industry with a focus on middle skills positions, or positions that do not require a degree from an institution. This section also includes information on hiring trends, work environments and descriptions of a typical day-in-the-life of an offshore worker.
2. Individual profiles for four occupations in the offshore industry. These profiles provide a snapshot of the occupations, typical duties and skills needed.

Each occupational profile includes additional information such as: Alternative job titles – Titles can vary. Alternative titles have been included to aid in job searches; salary information, and Skills Required.

UPDATE (1/27/17)- The Career Pathways guide is being disseminate to all partners; to the Community College Petrochemical Initiative (CCPI); the North American Process Technology Alliance (NAPTA); and HCC's website.

Objective 4: Create a curriculum for an incumbent field training program that combines current work duties with additional competency training to prepare workers for promotion along one critical middle skills career pathway (e.g., from Roustabout to Driller).

To complete, each DACUM required four visits with industry partners. For each visit the following occurred: 1.) 2-day workshop; 2.) Validation workshop; 3.) Management Review; and 4.) Task Analysis. Due to the fact that HCC had the good fortune of promoting many people from within during the life of this grant, and as a result there were three different leaders managing the grant, it was a challenge to complete packaging the overall curriculum for the program within the timeline provided. The last DACUM visit occurred at the end of November. In spite of this, and the grant ending, we will continue the work to meet the target of objective four.

UPDATE (1/27/17)- To achieve this objective, HCC will utilize the IADC competency database, the project DACUMs, and individual company job task analyses to conduct a gap analysis between the knowledge, skills, abilities and certification requirements at each career level. The results will be presented to the industry technical workgroup and two curriculum maps will be developed for each job position level within the career pathway- one for the on-the-job training component- and one for the related technical training component.

Initial Outcomes

This project primarily advances the Gulf Research Program through addressing safety culture and environmental protection systems associated with offshore oil and gas development. Indeed, all four tenets of this project-the prioritization of critical middle skills positions, the development of knowledge,

skills, and abilities for critical positions, the defining of career pathways, and the building of a model for an incumbent field training program- address the need for a stronger safety culture within the offshore oil and gas industry.

This work will create a model for an incumbent field training program that can be offered through a higher education institution and combines current work offshore with additional competency training. Currently, most institutions offer one or two stand-alone training certificate or degree programs that address the needs of the industry for entry-level rig crew members. Heretofore, institutions have not addressed career pathways; defining stackable credentials tied to various positions along career pathways is novel for this industry. This collaborative process between industry and education would define the competency gaps at each career level and facilitate curriculum development to address the technical and non-technical gaps.

Unexpected Results

N/A

Project Relevance

Educators, state government officials, federal government officials, and the private sector would be interested in the results of this project.

The findings of this project, especially the critical middle skills oil and gas industry positions, informs the prioritization of education and training program development over the next decade. This prioritization will have a profound impact on where industry, industry associations and institutions across the country place its limited resources.

The development of the DACUMs fosters alignment of curriculum with the knowledge, skills, and abilities as defined by the industry. This project primarily advances the Gulf Research Program through addressing "safety culture and environmental protection systems associated with offshore oil and gas development.

Secondly, the results of this project will ensure that all critical middle skills positions that potentially impact well operations have consistent and clearly defined knowledge, skills, and abilities that lead to positional competence.

Finally, the model for building incumbent field training programs will be replicable, across positions, across the industry, and across different educational institutions. As we continue to move forward to complete the work started through this project, we will have broken new ground to collaboratively define and offer an on-the-job and additional technical training program for a career rather than just a job; this is new territory for the upstream oil and gas industry and its educational partners.

Education and Training

Number of students, postdoctoral scholars, or educational components involved in the project:

- Undergraduate students: 0
- Graduate students: 0

- Postdoctoral scholars: 0
- Other educational components: 3

Mississippi Gulf Coast Community College; San Jacinto College; and Jones County Junior College

III. DATA AND INFORMATION PRODUCTS

This project produced data and information products of the following types:

- Data
- Curricula for education and training

DATA

See attached Data Report.

Other activities to make data discoverable:

Once validation for all of DACUMs for the three critical middle skills positions are completed, they along with the data will be available on the college's website.

INFORMATION PRODUCTS

Information Product Inventory:

See attached Information Products Report.

Other activities to ensure access to information products:

Once validation for all of DACUMs for the three critical middle skills positions are completed, they along with the data will be available on the college's website.

Data Report										
<i>Italicized text are sample answers.</i>										
Data Type: Select the option (from the dropdown) that best matches the data's domain or discipline (e.g., earth science data, ecological data, human health data)	DigitalResourceType: Select the option (from the dropdown) that best matches the resource format (e.g., data set, text, image or visual data, etc.)	Title: Provide a title for the resource	FileName: Provide the name of the digital file(s) (including file extension)	Creators: Provide the names of the persons who produced the resources (last name, first name; last name, first name; etc.	Point of Contact: Provide person responsible for answering questions about the data if other than project PI	PublicationYear: Provide the year that the resource was published or made available	RepositoryName/Publisher: Provide the name of the digital repository or curation facility where the resource is archived and available	DOI or Persistent URL: Provide a persistent identifier for the resource's location	Dataset Keywords: Please list any keywords used to describe the resource.	Publications: Provide the DOI for any publication that uses or references this resource
Data Type	DigitalResourceType	Title	FileName	Creators	PointofContact	PublicationYear	RepositoryName	DOI or Persistent URL	Keywords	Publications
<i>Physical and Computational Sciences</i>	<i>Tabular/Spreadsheet</i>	<i>Gravity Tests</i>	<i>GravityRawData.txt</i>	<i>Galieli, Galileo; Newton, Isaac</i>	<i>Lab Manager labmanager@science.edu 123-456-7890</i>	<i>1700</i>	<i>Really Big Digital Repoitory</i>	<i>doi: 10.1000/grav.1000</i>	<i>Gravity, object mass, force</i>	<i>doi: 10.1000/grav.1000.000, doi: 55.1097/science.4567</i>
Education and Training	Tabular/Spreadsheet	NAS Position	NAS Position Voiting	Joanna Kile	Joanna Kile	2017			Drill, Summit, Voiting Data	

Information Products Report									
<i>Italicized text are sample answers.</i>									
InfoProductType: Select the option (from the dropdown) that best matches the information product's media type (e.g., report, publication, model or simulation, etc.)	DigitalResourceType: Select the option (from the dropdown) that best matches the resource format (e.g., document, image, audio)	Title: Provide a title for the resource	FileName: Provide the name of the digital file(s)	Creators: Provide the names of the persons who produced the resources (last name, first name; last name, first name; etc.)	PublicationYear: Provide the year that the resource was published or made available	Publisher: Provide the publisher or the distributor of the resource (e.g., , institution name, repository name, etc.)	RepositoryName: Provide the name of the digital repository or curation facility where the resource is preserved and available	DOIorPersistentURL: Provide a persistent identifier for the resource's location	DatasetsAssociated: Provide DOI or link to any datasets that were used in the creation of this resource.
InfoProductType	DigitalResourceType	Title	FileName	Creators	PublicationYear	Publisher	RepositoryName	DOIorPersistentURL	DatasetReference
<i>InfoProductType</i>	<i>Software and Source Code</i>	<i>Gravity Simulations</i>	<i>AppleFalling.gravsim</i>	<i>Galieli, Galileo; Newton, Isaac</i>	<i>1701</i>	<i>Royal Society</i>	<i>Really Big Digital Repository for Models and Simulations</i>	<i>doi: 10.1000/grav.2000</i>	<i>doi: 10.1000/grav.1000, http://www.nodc.noaa.gov/cgi-bin/OAS/prd/accession/details/000000</i>
Curriculum	document	DACUM for Top Three Critical Middle Skill	DACUMs	Kile, Joanna; Ronk,	2017	Houston Community College			
Publication	document	Offshore Middle Skills Positions-A Career	HCC-Career	Kile, Joanna	2017	Houston Community College			