

**Diagnostic Imaging Workforce Development
Partnership of Community Colleges & Industry Stakeholders
in the Greater Sacramento Service Area (GSSA)**

Project Sponsor: Linda L. Zorn

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Operational Effectiveness
Facilitating Transformational Change

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I. Introduction

Outline

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1. Background Information

The Community College Chancellor's Office approached industry leaders from the Greater Sacramento Service Area (GSSA) for assistance with addressing workforce development challenges that had previously been identified related to diagnostic imaging technologists.

The industry leaders expressed a willingness to work with local community colleges to develop partnerships for the development of academic programs. These academic programs would educate primarily local GSSA residents and provide the diagnostic imaging industry organizations with skilled individuals for both entry level general radiology technologist positions and advanced modality technologist positions. Industry leaders also expressed a willingness to provide clinical workspace for the students to complete needed clinical hours for these academic programs.

2. Project Goal

The project goals included understanding the needs of the GSSA Diagnostic Imaging Industry around workforce development of diagnostic imaging technologists, identifying partnerships to be developed with GSSA community colleges to develop related academic programs, and developing a future state strategic roadmap for workforce development in the GSSA for diagnostic imaging technologists.

3. Overview of Approach

The project was divided into three phases. The first phase goal was to assess the workforce development needs of the GSSA Diagnostic Imaging Industry. The assessment involved collecting data and generating a report that provided visibility of the workforce development needs related to diagnostic imaging technologists. The goals of the second phase included meeting with the GSSA colleges to gain visibility of the plans regarding their current and planned academic programs related to diagnostic imaging, completing a gap analysis, and identifying partnership opportunities between the GSSA community colleges and GSSA industry stakeholders. The goal of the third phase was to develop a future state strategic roadmap related to the creation of the identified GSSA Community College/Industry workforce development partnerships.

4. Approach

The first phase focused on assessing the workforce development needs of the GSSA Diagnostic Imaging Industry in order to provide this information to the community colleges for the identification of partnership opportunities. During the first phase, industry stakeholders were interviewed to identify current and future needs related to diagnostic imaging technologist skill sets (i.e. MRI, CT, Intervention Radiology with a focus on Neurology, etc.); and barriers to ready access to appropriately trained individuals to meet their staffing needs. A list of organizations from which industry stakeholders were interviewed included:

- Dignity Health
- Marshall Medical Center
- Rideout Health
- Sutter Health
- UC Davis

Phase 1 concluded with a comprehensive report that provided visibility of the workforce development needs related to diagnostic imaging technologists. And, a meeting was held, facilitated by the consultant, between industry stakeholders and representatives from the Community College Chancellor's Office to discuss the Phase I findings.

Phase 2 involved meeting with stakeholders from the GSSA colleges to understand their plans regarding their current academic programs related to diagnostic imaging and any near term related programs planned for implementation. A list of community colleges interviewed included:

- Consumnes River College
- Folsom Lake College
- Yuba College

Pertinent data from the Phase 1 report was shared with the GSSA Diagnostic Imaging Colleges so they could better understand the workforce development needs of local industry. A gap analysis was then completed to identify the gaps between Industry's needs and the academic programs currently being offered in the GSSA.

GSSA community college stakeholders were asked to assess their interest in partnering with industry stakeholders to develop academic programs to meet the needs identified in the Phase 1 report. Specifically, they were asked to determine which diagnostic imaging technologist specialty areas they were interested in developing and/or maintaining (i.e. General Radiology Technologist, MRI

Technologist, CT Technologist, Intervention Radiology Technologist, Vascular Lab Technologist, Ultrasound Technologist, and/or Mammography Technologist).

Phase 3 focused on the development of a future state strategic roadmap for GSSA workforce development of diagnostic imaging technologists related to the partnerships identified in Phase 2. The consultant facilitated meetings between industry leaders and community colleges to identify the academic and clinical requirements that would lead to successful partnerships for GSSA diagnostic imaging technologist workforce development. Industry leaders provided the academic and clinical requirements for the different diagnostic imaging technologist academic programs.

Phase 3 concluded with the development of a future state strategic roadmap. A final meeting was facilitated by the consultant in which industry stakeholders and college stakeholders discussed the work completed with representatives from the Community College Chancellor's office, next steps and plans for the implementation of the diagnostic imaging technologist workforce development in the GSSA were reviewed and discussed.

II. Current State Assessment

Outline

1. Participants
2. Background Information
3. Goals of Current State Assessment
4. Data Collection
5. Feedback: Yuba College's Diagnostic Imaging Program
6. Vision of Industry Leadership

1. Participants

California Community Colleges Chancellor's Office Health Workforce Initiative

- Linda L. Zorn; Statewide Director/Sector Navigator
- Sue Hussey; Deputy Sector Navigator

Industry Leadership

- Anette Smith-Dohring; Sutter Health
- Brian Davis; Rideout Health
- Daniel Weaver; Marshall Medical Center
- David Del Pizzo, MHA, RVT; UC Davis Health System
- Marty Khatib, JD, RT; Dignity Health

Project Consultant/Facilitator

- John Paul Gallagher, PhD, EMT-P

Health System Participation

Dignity Health

- Mercy Hospital of Folsom
- Methodist Hospital of Sacramento
- Mercy General Hospital
- Mercy San Juan Medical Center
- Woodland Healthcare
- Sierra Nevada Memorial Hospital
- Dignity Health Imaging Outpatient Services

Marshall Medical Center

Rideout Health

Sutter Health

UC Davis Health System including:

- UC Davis Medical Center
- UC Davis Outpatient Center
- UC Davis Physician Offices

2. Background Information

Over the past forty years there has been a massive paradigm shift in the advancement of imaging technology. Significant advancements have been made in the areas of CT; MRI; Nuclear Medicine/PET-CT; Ultrasound/Vascular lab; Mammography; Interventional Radiology (Angiography), including the subspecialty of neuro-interventional radiology; and Picture Archiving and Communication System (PACS).

Regarding workforce development, industry stakeholders expressed an ever-increasing need to be nimble and to have dynamic surge capacity related to staffing demands, in particular the staffing of advanced modalities. An example shared during the data collection phase of this project was that millions of individuals across the United States, who were previously uninsured, recently signed up for health insurance. Diagnostic Imaging facilities which had cross-trained staff in advanced imaging modalities were better able to meet this increased demand for diagnostic imaging services resulting from this unexpected increase in patient volume. Another example of the need for cross-trained staff that was shared was the ability to flex staff on a daily and weekly basis for vacation, sick time, or as needed to meet patient throughput demands in hospitals, across all the different modalities.

Despite industry's desire to have additional staff cross-trained in advanced imaging modalities, the current method to obtain cross-trained individuals was neither effective nor sustainable for some health systems. An effective process for developing cross-trained staff was identified as needing to be developed and implemented.

Due to the significant technological advancements in the diagnostic imaging industry, i.e. the clinical diagnostic equipment for each modality, IT equipment, PACS, voice recognition, etc., additional training related to the needed knowledge, skills, and abilities (KSA) for Radiologists and Diagnostic Imaging Technologists are required. Industry stakeholders shared that Radiologists have a formalized education system that, depending on specialty, typically includes:

- Medical School (4 years)
- Internship (1 year)
- Residency (~1 - 3 years)
- Fellowships (~1 - 2 years)

Regarding technologist educational programs, industry stakeholders shared that Nuclear Medicine and Diagnostic Medical Sonography (Ultrasound and Vascular Lab) have well developed formal education programs and they typically higher individuals who have graduated from one of these programs. However, industry shareholders also shared that there is a scarcity of formal and affordable educational programs for the advanced modalities of: CT, MRI, Interventional radiology (IR), and Mammography.

As a result of the lack of formal academic programs, health systems will typically perform on-the-job-training for CT, MRI, Mammography, and Interventional Radiology (IR); and/or hire individuals with these specific skill sets. When they hire for these skill sets, this typically means another health system has spent the resources to train these individuals and must then recommit the time and energy to train additional individuals when staff leave their organization. This cycle repeats itself over and over. Industry stakeholders shared that as staffing demands increase, this model becomes less and less effective.

3. Goals of Current State Assessment

The overall goal of the current state assessment was to understand the needs of the GSSA Diagnostic Imaging Industry around workforce development of diagnostic imaging technologists and to share this information with community colleges to determine which colleges were interested in developing partnerships with industry to develop and / or enhance related academic programs. Specific questions that were asked of industry stakeholders were:

- A. What are the GSSA Diagnostic Imaging Industry's workforce development needs for the next five years?
- B. What are the business growth and attrition rates in the following areas:
 - a) General Radiology,
 - b) CT, MRI, Interventional Radiology (IR),
 - c) Mammography,
 - d) Ultrasound/Vascular Lab, and
 - e) Nuclear Medicine/Pet-CT?
- C. How does industry currently recruit and train?
- D. Where does GSSA industry hire from and why?
- E. Does GSSA region need another Entry Level Technologist program?
 - a) Will industry have positions available post graduation?
 - b) Number of applications for current positions?

4. Data Collection

Industry stakeholders expressed interest and willingness to partner with community colleges for advanced modality workforce development in the following areas:

- Computed Topography (CT)
- Magnetic Resonance Imaging (MRI)
- Interventional Radiology (IR) and subspecialty Neuro Interventional Radiology
- Ultrasound/Vascular Lab (US/VL)
- Mammography
- Picture Archiving and Communication System (PACS)

The majority of GSSA Imaging Leadership supported the national trend to develop a process for Diagnostic Imaging Technologists to eventually obtain a BS degree. GSSA Imaging Leadership also shared their interest in setting expectations with individuals, prior to the start of a General Technologist program, that industry desires they become cross-trained in multiple modalities. X-ray training is simply the starting place. Some industry stakeholders also expressed an interest in developing a management program for career advancement opportunities for diagnostic imaging technologists.

UC Davis had ready access to their recent hiring data. Table 1 lists the number of applicants that recently applied to work at UC Davis for the advanced modalities of CT, MRI, and Ultrasound (US). The table also lists the number of individuals that applied that were qualified by the health system’s human resources department, the number of individuals that were hired for each advanced modality, and the number of weeks each position was posted.

**Table 1 - Applicants for Advanced Modalities
UC Davis Health System**

Position	Applied	Qualified	Hired	Position Posted
CT – 1 FT	17	11	1	2 weeks
MRI – 2 PD	10	6	2	2 weeks
US – 2 PD	12	7	2	2 weeks

**FT = Full-time position
PD = Per Diem position**

Industry stakeholders shared that hospitals, in particular trauma centers, have a greater skill demand than outpatient clinics. Technologists in a hospital, especially when working the night shift when no in house backup is available to assist, must be capable of performing all potential types of scans. As a result, when determining if an individual was qualified for a particular position, questions such as the following are used when reviewing an applicant’s background for a diagnostic imaging technologist position:

- Did the individual graduate from an accredited program?
- In what type of setting did students complete their clinic hours?
 - Inpatient vs. Outpatient
 - Community Hospital vs. Regional Trauma Center

Prior to collecting data related to projected business growth and attrition rates over the next five years, industry stakeholders were asked to subjectively rank their 1st, 2nd, and 3rd choice for workforce development efforts. Table 2 lists the results of this

survey. The findings show that the majority of the directors interviewed believed that the greatest need for workforce development was in the areas of CT, MRI, and Ultrasound/Vascular Lab. Industry stakeholders shared that currently, there was no formal academic program in the GSSA region for CT and MRI advanced modalities. Consumnes River College had recently developed and implemented an Ultrasound program, but it had not yet obtained accreditation.

Table 2 - Opinion of Imaging Directors: Modality Priority

Priority	Mammography	CT	MRI	US/VL	IR	NM/PET-CT
First	1	5	2	2	2	1
Second	0	0	2	5	1	1
Third	1	2	4	1	0	0
Total	2	7	8	8	3	2

Diagnostic imaging directors were then interviewed to learn the projected number of additional staff that they expected to hire over the next five years as a result of both business growth and attrition rates. Table 3 lists the data obtained from interviews with the diagnostic imaging directors, by modality, and by health system.

Table 3 - Number of FTEs to be Hired Over the Next Five Years

	General	Mammo	CT	MRI	US/VL	IR	NM/PET-CT
Dignity	42	16	32	34	30	17	15
Marshall	2	1.5	4	2	2	1	2
Rideout	13	0	5	1	2	3	2
UC Davis	15	3	7.7	7	5.5	2	2.5
Total	72	20.5	48.7	44	39.5	23	21.5
Average per year	14.4	4.1	9.7	8.8	7.9	4.6	4.3

Related to the advanced modalities of both Nuclear Medicine/PET-CT and Diagnostic Medical Sonography (Ultrasound and Vascular Lab), industry stakeholders shared that these modalities require unique training. As a result they typically hire specifically for these skill sets. They also shared that they would be willing to train students enrolled in related academic programs. However, when a position is open they want to hire an individual who is trained and ready to go. They do not want to start training at that time. Fortunately, they shared that both of these modalities typically have low turnover.

It is also important to share the unique workforce development needs of outlying hospitals that face different challenges than regional city hospitals and medical centers. Outlying / rural hospital directors shared that recent national searches had occurred for their hospitals for Ultrasound Technologists and General Technologist positions. Unfortunately, for these outlying / rural hospitals, many trained individuals lacked the ability and/or interest to relocate their family to a rural area.

Data was also collected from imaging department directors regarding the number of individuals who applied and the number of individuals hired for General Technologists positions that had been posted during the previous 12 months. Table 4 lists this data by health system, for full-time and per-diem positions, along with the number of weeks these positions were posted.

Table 4 - Applications for General Technologist Positions

Health System	Position	Applicants	Hired	Job Posting
Dignity	Per-Diem	10-17	1-3	1 week
Dignity	Full-Time	25-57	1-2	1 week
Marshal	Per Diem/Full-Time	10	1	1-2 week
Rideout	Per Diem	15	1	2 week
Rideout	Full-Time	25	1	2 week
UC Davis	Per Diem	36	2	2 week

Industry stakeholders shared that many general technologist students upon graduation start in Per Diem positions, which are non-benefitted positions with no guarantee of hours. They also shared that some general technologists upon graduation have been unable to find Technologist employment post-graduation and consequently seek employment opportunities as patient transporters, imaging department office clerks, or unrelated employment opportunities. Industry stakeholders stressed that advanced modality training is the common path to full-time benefitted positions.

The majority of industry stakeholders interviewed expressed interest for enhancements in Yuba College's current program, and did not express interest, at this time, to launch another entry-level general diagnostic imaging technologist academic program in the GSSA.

5. Feedback: Yuba College's Diagnostic Imaging Program

To assess the need for enhancements with Yuba College's current diagnostic imaging program, the following groups of individuals were interviewed: recent graduates of Yuba College, clinical instructors, clinical supervisors and lead techs, and department leadership. During these interviews the following areas were identified as opportunities for enhancements:

- Communication from college leadership regarding college's commitment and future plans for program, in particular the succession plan for the current program director who has indicated she expects to retire within about two years;
- Admission / career orientation process;
- Clinical rotation learning process;
- Curriculum enhancements, requested from Industry leadership; and
- Program geographical location, specifically lack of a satellite campus in Sacramento.

Industry stakeholders shared that there is a very, very long wait list – several years to be admitted into Yuba College's diagnostic imaging program. They expressed concern that this long wait list promoted the acceptance and subsequent graduation of primarily students who were good at being on a waiting list. Recent graduates also shared several stories related to classmates resigning and/or transferring to another program after determining that they really did not want to be a diagnostic imaging technologist. They shared that these resignations occurred after students began their clinical hours. These stakeholders shared that they believed a lack of exposure and subsequent lack of awareness of the clinical environment, such as a busy emergency room, prior to starting clinic rotations resulted in these resignations.

Industry stakeholders also expressed a desire for curriculum enhancements that focused on current technology, such as digital versus film, a more in-depth understanding of regulatory requirements, and development of critical thinking/problem solving skills similar to Lean Six Sigma (effectiveness, efficiency, productivity, etc.). There was also a desire to spend additional time developing skills associated with leadership development and to focus on topics such as quality metrics for ongoing daily operational process improvement including patient safety and patient satisfaction.

During these interviews, stakeholders expressed a strong preference for the previous instruction model utilized at Yuba College's Sacramento Campus for Diagnostic Imaging that included:

- Frequent clinical site visits by academic instructor,
- Frequent dialogue between academic instructor and clinic instructors,
- On-site dialogue with all students and review of clinical images completed by students, and
- On-site monitoring of student performance.

However, they realized that the current staffing and geographical location of the clinical sites related to the academic classroom and consequently the teaching faculty, strongly affected the dynamics of the current teaching model.

6. Vision of Industry Leadership

Stakeholders shared that currently individuals after graduating from an accredited program, typically find work as a per diem technologist. It is important to mention that industry stakeholders shared that they prefer to hire individuals who completed their academic program clinical hours in their hospital, or at least within their health system. In addition to having observed the student's work ethic and skill competencies, when a student completes their clinical hours at a facility, they learn not only the industry standard protocols, but they also learn location specific procedures and protocols. Therefore, if this individual is subsequently hired there is a significant reduction in the amount of time required for new employee orientation.

Industry stakeholders shared that they would like to form partnerships with community colleges to develop academic programs to facilitate their staff's ability to obtain needed training to become cross trained in advance modalities. It is their vision that individuals once hired, would enroll in community college programs, complete training in advanced modality training, become a per-diem advanced modality technologist, and then when a full-time or part-time advanced modality position becomes available, an individual would be available to be hired internally from a per diem advanced modality position.

III. Development of a Future State Strategic Roadmap

Outline

1. Participants
2. Gap Analysis
3. Advisory Board for GSSA Community Colleges Diagnostic Imaging Programs
4. Advanced Modalities Program: Folsom Lake College
5. Diagnostic Imaging Program: Yuba College
6. Diagnostic Medical Sonography Program: Consumnes River College

1. Participants

California Community Colleges Chancellor's Office Health Workforce Initiative

- Linda L. Zorn; Statewide Director/Sector Navigator
- Sue Hussey; Deputy Sector Navigator

Folsom Lake College

- Kim Harrell, Ph.D.
- Monica Pactol, Ph.D.
- Rachel Rosenthal Ed.D.

Yuba College

- Angela Willson, Ph.D., RT CRT
- G.H. Javaheripour, Ed.D.
- Tom McKay Ph.D., RN

Consumnes River College

- Dionne Winter, MSET, RDMS
- Bob Johnson, M.P.A

Industry Leadership

- Anette Smith-Dohring; Sutter Health
- David Del Pizzo, MHA, RVT; UC Davis Health System
- Marty Khatib, JD, RT; Dignity Health

Project Consultant/Facilitator

- John Paul Gallagher, Ph.D., EMT-P

2. Gap Analysis

Outline

- A. Industry feedback: Advanced modalities
- B. Industry feedback: General technologist program
- C. Community colleges' strategic plans
- D. Gaps identified

A. Industry Feedback: Advanced Modalities

- a) Desire development of advanced modality training programs in modalities of CT, MRI, IR, Neuro IR, Mammography, and Vascular lab
- b) Desire to facilitate opportunity for incumbent workforce to have access to advanced modality training
- c) Develop accredited program(s) for college credit
- d) Ability for students to be able to transfer these credits into a degree program with the goal being able to obtain a BS degree in a related field of study
- e) Require faculty to have current knowledge and experience in both the pertinent advanced modality(s) as well as related technology equipment
- f) Willing to explore the possibility of providing staff to serve as adjunct professors
- g) Desire college partners to have ability to flex number and frequency of classes depending on current and projected regional workforce staffing needs
- h) Obtain timely accreditation of current Ultrasound program

B. Industry Feedback: General Technologist Program

- a) Graduation of high caliber students that have desire and ability for ongoing training in advanced modality training; and who have excellent professional work attitude and behaviors
- b) Desire understanding of Yuba College's ongoing commitment to current program
- c) Desire clarification regarding the succession plan for current program director's retirement
- d) Desire improved administrative process of program, historically Yuba College has relied heavily on industry to trouble shoot and provide resources
- e) Indicated enhancements are needed with the following:
 - i. Admission / career orientation process,
 - ii. Clinical rotation learning process,
 - iii. Curriculum enhancements, and
 - iv. Reevaluation of the location of weekly classes - currently all classes are held at Yuba College

C. Community Colleges' Strategic Plans

- a) New College President and New Director for Nursing and Allied Health Programs were recently hired at Yuba College
- b) New leadership at Yuba College indicated commitment to their current program and expressed willingness to work with industry partners to modify program to meet industry's needs
- c) Yuba College has previously developed curriculum for a mammography program and expressed a willingness to work with industry partners to implement, when industry partners believe timing is appropriate
- d) New program director has been hired at Consumnes River College
- e) Work has been initiated by this new program director at Consumnes River College to complete accreditation requirements for current Ultrasound Program.
- f) Development of additional advanced modalities were not currently planned at any community college
- g) Folsom Lake College indicated a willingness to develop programs in CT, MRI, and IR with Neuro IR subspecialty for credit
- h) Folsom Lake College expressed willingness to offer these advanced modality programs at a frequency which is based on ongoing feedback from industry partners related to current and projected staffing needs
- i) Consumnes River College expressed willingness to discuss with industry the potential of including a vascular lab program with their ultrasound program, post – accreditation of their ultrasound program

D. Gaps Identified

- a) Need for a structured process to allow for enhanced communication and collaboration between the different community college's offering diagnostic imaging programs
- b) Development of advanced modality programs for CT, MRI, and IR with Neuro-IR subspecialty at Folsom Lake College
- c) Determine curriculum and other program enhancements needed at Yuba College
- d) Development of a succession plan for current program director's retirement at Yuba College

3. Advisory Board for GSSA Community Colleges Diagnostic Imaging Programs

Outline

- A. Goals for Advisory Board
- B. Initial focus of Advisory Board
- C. Charter Members of Advisory Board
- D. Strategic Leadership Organizational Representation
- E. Invitations to Join Advisory Board
- F. Selection of Chair/Co-chair
- G. Ongoing Measurement Reporting
- H. Next Steps

A. Goals for the Advisory Board

- a) Creation of a regional advisory board for GSSA community colleges that offer diagnostic imaging programs
- b) Replace individual Advisory Boards currently in place for each of the Community College's Diagnostic Imaging Programs
- c) Promote efficient flow of information and collaborative decision making between the community colleges offering diagnostic imaging programs
- d) Promote feedback and guidance from industry to facilitate the development and implementation of new programs and enhancement of current programs
- e) Increase industry strategic leader participation at every Advisory Board meeting by reducing the total number of Advisory Board meetings that industry stakeholders are asked to attend
- f) Encourage attendance of strategic leaders from all organizations versus operational supervisors attending other current Advisory Boards
- g) On annual basis, identify frequency and start dates for the different diagnostic imaging programs offered in the GSSA region by community colleges
- h) On an ongoing basis, review general operations of programs, including: number of graduates by program, competency of students, working relationships between community colleges and industry partners (i.e. clinic rotation process, identifying adjunct faculty from industry, etc.), and identify pertinent resources as needed
- i) Meet at least twice annually to fulfill Community College Advisory Board requirements
- j) Identify working relationships to develop with community colleges, industry, 4-year degree program(s), and private college(s), as appropriate (i.e. articulation agreements, scheduling clinic hours, etc.)

B. Initial Focus of the Advisory Board

Charter members determined that the initial focus would be to review and discuss the following:

- a) Advanced Modality curriculum development and program implementation at Folsom Lake College for CT, MRI, IR, and Neuro IR*,
- b) Implementation of program enhancements at Yuba College's General Diagnostic Imaging Technologist Program *, and
- c) Monitor accreditation status of Consumnes River College's Ultrasound Program.

* Note: Community college stakeholders have indicated if their programs are to be successful, significant input from industry stakeholders will be required.

C. Charter Members of the Advisory Board

a) Academic Institutional Members

- Community College Chancellor's Office (Linda L. Zorn and Sue Hussey)
- Consumnes River College
- Folsom Lake College
- Yuba College

b) Industry Members

- Dignity Health System
- Sutter Health System
- UC Davis Health System

D. Strategic Leadership Organizational Representation

In order to facilitate pertinent feedback and decision making at each Advisory Board meeting, charter members agreed to identify one strategic leader from each of their organizations to be a member of Advisory Board, and one strategic leader to be an alternate. They also agreed to set the expectation with these organizational representatives that one member from their organization should attend each Advisory Board meeting.

E. Invitations to Join Advisory Board

It is planned to also invite that the following organizations:

- Marshall Medical Center and Rideout Health (both provided valuable input during the current state assessment)
- Industrial representatives from the Far North Region of California. Yuba College currently provides education to residents of this region for their General Diagnostic Imaging Technologist Program. Since it is planned that this Advisory Board will replace the current Advisory Board for Yuba College, it was desired to ensure industry representation from this region. It is also anticipated that, if not initially in-person, perhaps if and/or when the advanced modality training at Folsom Lake College was offered by tele-education, Industry stakeholders from the Far North Region would be interested in having their staff participate in the GSSA advanced modality programs.

F. Selection of Chair/Co-Chair

Representatives from the Community College Chancellor's Office suggested the Advisory Board be chaired by an industry representative and co-chaired by a community college representative; other Advisory Board charter members agreed. Community College Chancellor's Office indicated a willingness to volunteer their staff to develop agendas and take meeting minutes on an ongoing basis:

- Anette Smith-Dohring (Sutter Health) and David Del Pizzo (UC Davis) nominated Marty Khatib (Dignity Health) to be the Chair of the Advisory Board
- Sue Hussey (Chancellor's Office) volunteered to be Co-chair of Advisory Board

G. Ongoing Measurement Reporting

- a) Health Systems: Number of staff by modality, by health system, to be hired annually for each of the next three years, and
- b) Academic Institutions: Academic programs planned to be offered by each academic institution over the next three years with anticipated start dates and number of students to be enrolled.

H. Next Steps

- a) Notify current members of each school's advisory board of the transition to this new regional advisory board.
 - i. Yuba College's Advisory Board (Tom McKay)
 - ii. Consumnes River College's Advisory Board (Sue Hussey)
- b) Location of first meeting was agreed by charter members to be held at Yuba College, subsequent meeting locations would then rotate to different industry and community college locations.
- c) It was tentatively decided to hold the first meeting in late August 2015, for 1.5 hours during lunch, lunch to be provided to participants.
- d) Identify date / time of first advisory board meeting (Marty Khatib, Advisory Board Chair).
- e) Send meeting invite for first meeting to include: Charter Board Members, Marshall Medical Center, Rideout Health, and participants from Yuba College's current board located in the Far North Region of CA (Marty Khatib)
- f) Allocate administrative resources to develop Advisory Board meeting agendas and minutes (Sue Hussey, Advisory Board Co-Chair)

4. Advanced Modalities Program: Folsom Lake College

Outline

- A. Develop advanced modality academic programs in CT, MRI, and IR with subspecialty in Neuro IR
- B. Develop articulation agreement(s) with BS degree programs
- C. Select suitable academic program structure
- D. Utilize industry clinical specialists/leaders as adjunct professors
- E. Ensure industry desired accreditation is accomplished
- F. Ensure financial aid is an option available to students

A. Develop advanced modality academic programs in CT, MRI, and IR with subspecialty in Neuro IR

Goals

- Concurrently develop advanced modality academic programs in CT, MRI, and IR, including sub-specialty of Neuro-IR;
- Facilitate the efficient development of curriculum and develop a “best-in-class” curriculum;
- Implement CT curriculum first; and
- MRI and IR to be implemented at the appropriate time as determined by the Advisory Board.

Curriculum development was identified as the priority action item for allocation of resources. Stakeholders identified that the Community College Chancellor’s office curriculum approval process is a lengthy process. As a result, stakeholders discussed potentially using experimental course designations to pilot the curriculum as it moved through the curriculum approval process. Each of the industry stakeholders also expressed a desire for their organization to contribute resources to review the final draft of curriculum.

B. Develop articulation agreement(s) with BS degree programs

Industry stakeholders expressed their desire for the community colleges to develop articulation agreements with 4-year colleges. These articulation agreements would facilitate individuals enrolled in GSSA academic diagnostic imaging programs to transfer credits from these programs into BS degree programs. Specifically, it was discussed to potentially develop articulation agreements with multiple programs to assist individuals having access to 1) affordable BS degree program, and 2) online/distance modules for PACS administrator, and / or leadership development.

Related background information highlighted the general frustration expressed by industry staff members that without a BS and/or MS degree, individuals were not eligible for career advancement opportunities in education and/or management. Consequently, Industry leaders expressed the desire for individuals to be able to transfer credits from community colleges to 4-year colleges to facilitate the completion of a BS degree. Industry stakeholders also expressed a strong desire for students to have the option to complete a BS degree that did not require the occurrence of high tuition, and subsequently high student loan debt.

However, industry leaders indicated that the priority was to develop and implement affordable advanced modality programs in an effective and very timely manner that

provided the needed education for career advancement in their clinical environment as advanced modality technologists. Over the next several years, students are planned to enroll at Folsom Lake College with varied educational backgrounds including individuals with the following:

- Associate degree (AS) from Yuba College or other AS degree program
- Certificate of completion with college credit
- Certificate of completion without college credit

Community college stakeholders identified that obtaining lower division credit for advanced modality training that would transfer into a 4-year degree program would be difficult, if not impossible. Lower division credits refer to the first two years of college, while upper division credit refers to post AS degree credits, 3rd and 4th year level courses in a BS degree program.

However, for individuals who lack an AS degree from an academic institution with articulation agreement to a 4-year program, it is desired to explore the possibility of transferring credits earned in advanced modalities at Folsom Lake College into a BS degree program as lower division credit, potentially at a private college such as Loma Linda. Stakeholders discussed researching articulation agreements with: CSU-Northridge, Loma Linda, and potentially other colleges.

C. Select suitable academic program structure

Goals

- a) Spring 2016 target date for CT program implementation (Students enrolled Spring 2016)
- b) Short-term plan: fast-track curriculum development and implementation of programs (non-credit option is acceptable to industry for short term effectiveness and efficiency)
- c) Long-term plan: classes for college credit with articulation agreement into 4-year BS degree programs
- d) Industry indicated desire to make their clinical space available to their incumbent workforce to train prior to other students from the public
- e) Academic program models identified for further research are as follows: (research to be conducted in parallel with curriculum development)
 - Apprenticeship model
 - Regular admission model

Stakeholders discussed a three-phase implementation plan for advanced modality programs at Folsom Lake College.

Phase 1 (Pilot Program) Goals

- Rapid implementation of program to allow method for testing and modifying curriculum,
- Explore utilization of experimental classes,
- Explore community education model using grant money,
- Research applicability of apprenticeship model, and
- Both academic and industry stakeholders acknowledged the probability that college credits would not be awarded to students during this pilot phase of implementation.

Phase 2 (First 3-5 years) Goals

- Provide academic programs at frequency that meet the needs of GSSA Industry partners,
- GSSA Industry partners indicated desire to have ability to give first priority utilization of their clinical workspace for training to their incumbent workforce,
- Start with GSSA enrollment base but then expand to include larger geographical area, and
- Explore distance-learning opportunities to increase enrollment.

Phase 3 (5+ years) Goals

- Provide academic program at frequency that meets the needs of GSSA Industry partners and which does not exceed demand,
- GSSA Industry stakeholders indicated that they would be willing to make their clinical space available for clinical training to all students, similar to model used with current General Diagnostic Imaging Technologist Programs, and
- Potentially expand to include larger geographical area by exploring distance-learning opportunities.

After piloting of the program is completed, industry stakeholders expressed their desire for the goal of the second phase of implementation to focus on training their incumbent workforce. Industry stakeholders estimated it would take 3-5 years to cross-train their current workforce. Industry stakeholders envision their staff members initially receiving training in one advanced modality. Some staff members may choose to also receive training in additional advanced modalities. Staff should include: full-time, part-time, and per diem employees.

Each industry facility typically has only 1-2 CT and MRI machines; therefore there is limited time available for training on this equipment. Industry stakeholders expressed their desire for triggers for the final phase, Phase 3, of implementation to begin as:

- Staff currently employed by GSSA industry stakeholders have been offered the opportunity to receive Advanced Modality training, and
- Colleges need additional individuals to enroll to make offering the courses a viable option.

During all phases of implementation industry stakeholders expressed the willingness to explore sharing their clinical workspace with other regional industry members. For example, potentially due to scheduling logistics, an employee at UC Davis might train at Dignity Health, while at the same time an employee at Dignity Health is training at UC Davis. Community College leadership also expressed the desire for Industry leadership to provide, on an annual basis, projections of expected staffing needs for the subsequent three years. This would allow the colleges to plan for appropriate resources to be available and plan for which Advance Modality courses (CT, MRI, and IR) to offer during which academic semester(s).

D. Utilize industry clinical specialists/leaders as adjunct professors

Industry stakeholders expressed a desire for students to be trained by faculty that have current knowledge and experience in both the pertinent advanced modality and related current technology equipment. Industry stakeholders expressed a willingness to explore the possibility of providing staff to serve as adjunct professors during all phases of the implementation – Pilot phase, Second phase, and Third phase.

E. Ensure industry desired accreditation is accomplished

Industry stakeholders expressed their need for technologists to be ARRT certified in the advanced modalities. Industry stakeholders also expressed concern that regulatory bodies change their certification requirements on relatively short notice. Therefore, they wanted the academic institutions to stay alert and one step ahead of potentially new regulatory requirements. Industry stakeholders also identified that research by advisory board members was needed on the following:

- State of California requirements for staffing and accreditation, and
- ARRT certification requirements for facilities teaching advanced modalities.

This additional research would help facilitate the decision making process regarding the experience and education requirements for a program director of the advanced

modality program.

F. Ensure financial aid is an option available to students

Stakeholders expressed the desire for an academic model to be selected that allowed for financial aid to be an option for students. Tuition reimbursement with different annual maximums for each of the different health systems is typically an option for full-time employees. However, not all industry stakeholders provide tuition reimbursement for part-time and per-diem employees. Therefore, it was expressed that the chosen academic model should allow for financial aid.

5. Diagnostic Imaging Program: Yuba College

Outline

- A. Improve timeliness of communication, and college's effectiveness and efficiency in their effort to continuously assess and modify program to meet evolving needs of their Industry partners
- B. Enhance admission/career orientation process
- C. Enhance curriculum with desired knowledge, skills, and abilities
- D. Enhance clinical hours learning process
- E. Develop articulation agreement(s) with BS degree programs
- F. Succession plan for program director's retirement
- G. Reassess possibility of a satellite campus location
- H. Consider implementation of mammography program
- I. Reallocation of operational costs for ongoing equipment maintenance

A. Improve timeliness of communication, and college’s effectiveness and efficiency in their effort to continuously assess and modify program to meet evolving needs of their Industry partners

Industry partners desire graduates whose knowledge, skills, and abilities (KSA) will allow them to meet the increasing intellectual demands of the diagnostic imaging industry. Industry stakeholders expressed general frustration regarding Yuba College’s administration of their program, especially with the lack of response to their feedback and enhancement requests.

Recently, a new College President and new Director for Nursing and Applied Health Program began working at Yuba College and joined the team working on this diagnostic workforce development project. These new leaders acknowledged that there previously had been a lack of timely decision-making and appropriate communication to industry stakeholders, in particular, related to:

- Leadership’s commitment to current program,
- Development of succession plan for the current program director who has indicated she expects to retire within about 2 years, and
- Willingness to enhance program to meet current needs of industry.

Yuba College’s new leadership team affirmed their commitment to the program and their willingness to enhance the current program to meet the needs of industry stakeholders.

B. Enhance admission/career orientation process

Stakeholders identified there was a need for an enhanced admission and career orientation process to accomplish the following goals:

- a) Explore development of an introductory course to be completed prior to the start of program,
- b) Ensure students enrolled in program understand industry expectation for continued training in advanced modalities,
- c) Assist students in identifying if they have desire and capability of not only completing general technologist training but also completing subsequent training in advanced modalities, and
- d) Assist interested individuals in answering questions similar to:
 - “Am I really interested in pursuing a career in health care as a patient-care provider in a clinical environment?”;
 - “In particular, am I interested in working in a fast-paced work environment in a hospital ER and surgical procedure areas where

there is a high probability of dealing with bodily fluids and infectious diseases”; and

- “Specifically, am I interested in pursuing a career as a Diagnostic Imaging Technologist?” (Vs. nurse, lab tech, etc.)

Industry staff members, management, and recent Yuba College graduates brainstormed the following for consideration for inclusion in an introductory course:

- a) Require a minimum 80 hours observation as volunteer in hospital imaging service departments;
- b) Provide career planning information related to:
 - Career opportunities in: General radiology, CT, MRI, IR, Mammography, Ultrasound/Vascular Lab, and Nuclear Medicine, and
 - Expectations of employers in GSSA for initial employment, typically as a per-diem, and the common requirements for full-time/part-time benefited positions;
- c) Review knowledge, skills, abilities (KSA) to be obtained in AS Program at Yuba College;
- d) Discuss articulation agreements in place with 4-year degree program(s) for BS degrees; and
- e) Share potential training opportunities in Advanced Modalities, post initial education.

C. Enhance curriculum with desired knowledge, skills, and abilities

Industry stakeholders expressed a desire to enhance the current curriculum to include additional knowledge, skills, and abilities desired by industry stakeholders of new hires. The list of desired curriculum enhancements related to knowledge, skills, and abilities (KSA) included the following:

- a) Modify curriculum to focus on current technology (digital vs. film),
- b) Enhance to ensure an understanding of regulatory requirements (JCAHO, CMS, etc.),
- c) Develop critical thinking and problem solving skills,
- d) Include concepts of Lean Six Sigma workflow analysis (effectiveness, efficiency, productivity, quality, customer focus, etc.),
- e) Include quality metrics for ongoing daily operational process improvement, such as,
 - i. Patient safety,
 - ii. Patient/Customer satisfaction, and
- f) Incorporate leadership development.

Academic stakeholders discussed the possibility of utilizing the concept of developing “threads” through the curriculum to help incorporate curriculum enhancements, such as: critical thinking skills, problem solving abilities, and leadership development. “Threads” are currently used in nursing program curriculum development processes.

D. Enhance clinical rotation learning process

Stakeholders shared that previously, Yuba College had a Sacramento based diagnostic imaging program satellite campus, in addition to their program based at Yuba College. Both Industry leadership and recent graduates expressed a preference for the instruction model that had been utilized at this now discontinued campus. Students and hospital staff indicated that this previous model included:

- a) Frequent clinical site visits by academic instructor with frequent dialogue between academic instructor and clinic instructors,
- b) On-site dialogue by academic instructor with all students and review of clinical images completed by students by academic instructor,
- c) On-site monitoring by academic instructor of student performance of taking images, and
- d) On-site assessment by academic instructor of each student’s strengths and weaknesses to determine the most appropriate next clinic site rotation to attend to develop their clinical skills.

It is important to note that with the discontinuation of the Sacramento based satellite campus there is now currently a longer commute distance between academic campus/instructor and clinical sites in the Sacramento area that hampers this type of on-site interaction.

E. Develop articulation agreement(s) with BS degree programs

As previously discussed in the Folsom Lake College – Advanced Modalities section of this report, industry stakeholders expressed a strong desire for articulation agreements to be developed with 4-year degree programs. These articulation agreements would facilitate the ability of individuals enrolled in GSSA academic imaging programs to transfer credits to facilitate individuals having access to affordable BS degree programs that included online/distance module for: PACS administration, and leadership development.

Staff and leadership expressed frustration with not being eligible for career advancement opportunities in education and/or management due to lack of BS and/or MS degree. Consequently, Industry leaders expressed the desire for individuals to be able to transfer credits from community colleges to 4-year colleges to facilitate staff being able to complete a BS degree. Stakeholders also expressed a strong desire for students to have option to complete a BS degree that did not require high tuition costs, and subsequently high student loan debt. However, Industry leaders indicated that the priority was to first enhance Yuba College's current program to ensure high caliber individuals graduated and would then continue to pursue education in advanced modalities. Stakeholders discussed researching articulation agreements with: CSU-Northridge, Loma Linda, and/or other private colleges.

F. Succession plan for program director's retirement

Stakeholders shared that the current diagnostic imaging program director has indicated several times to industry stakeholders that she plans to retire within about two years. Industry stakeholders expressed concern that a succession plan has not been developed to ensure program integrity during this near term future transition period. This was particularly concerning to stakeholders because the current program director, in addition to her management responsibilities, teaches all the didactic classes for Yuba College's Diagnostic Imaging Program.

As previously mentioned in this report, the new college leadership which has recently arrived at Yuba College expressed their commitment to the diagnostic imaging program, and in particular their commitment to determine appropriate next steps to develop a succession plan, and obtain additional staff to ensure program stability and integrity during the upcoming transitional period.

G. Reassess possibility of a satellite campus location

Yuba College's new college leadership expressed their willingness to explore the possibility of recreating a satellite-based program in the Sacramento Area, which would include offering courses, non-lab related, in Sacramento area. Recent Yuba College graduates that were interviewed for this project in GSSA region indicated they preferred attending classes in the Sacramento area versus Yuba College's main campus. Related to this, GSSA leadership also expressed a desire to hire individuals who received their clinical training in the high volume GSSA regional hospitals.

The vision now being considered by Yuba College leadership also considers the academic teaching professor's physical location. In this vision, courses could potentially be taught and televised from either Yuba College's main campus, a Sacramento based satellite campus, and/or a CA Far North region based satellite campus.

It was discussed that creating one or more satellite campuses would facilitate easy local access to lectures by students. Students would have the choice of either attending class at a televised location or potentially driving a further distance to attend live instruction. Of particular interest was the potential ability to increase the recruitment and utilization of adjunct professors. Having satellite campus(s) with appropriate tele-education equipment would facilitate the ability of recruiting adjunct professors from different geographical areas to teach classes in their areas of expertise. Next steps discussed are for Yuba College to collect and analyze data to determine geographical distribution of current students and planned enrollees in their next diagnostic imaging class, and to develop plan for staffing future classes.

H. Consider implementation of Mammography Program

During the data collection phase of this project some industry stakeholders expressed desire for a mammography program to be developed and implemented. Also, during the data collection phase, it was discovered that Yuba College had previously developed a Mammography Program. However, it was not previously implemented due to difficulties finding clinical sites for all potential students.

There was interest expressed by some industry stakeholders to refine the mammography curriculum to include recent developments in Nuclear medicine. However, Industry stakeholders indicated that the implementation of enhancements to the current General Diagnostic Imaging Technologist Program was the priority versus implementation of a Mammography Program. Yuba College leadership expressed a willingness to implement the Mammography Program and to explore the potential inclusion of recent developments in Nuclear Medicine, at the appropriate time indicated by industry stakeholders, if clinical sites were made available to students.

I. Reallocation of operational costs for ongoing equipment maintenance

Yuba College leadership recognized that the College does not have subject matter expertise related to ongoing maintenance of radiology equipment, and asked the newly formed Advisory Board for assistance.

The question to be researched is it feasible for industry stakeholder(s) to include the maintenance of Yuba College's radiology equipment in their current maintenance agreements with vendors. Thus, allowing Yuba College the ability to re-allocate budgeted operational dollars associated with specialized expertise of equipment maintenance to other areas, perhaps hiring additional faculty.

Next step is for Yuba College to submit a list of current radiology equipment to the Advisory Board so that industry stakeholders are able to discuss and assess feasibility with their current equipment vendors.

6. Diagnostic Medical Sonography Program: Consumnes River College

Outline

- A. Commitment to Current Program
- B. Accreditation of Ultrasound Program
- C. Vascular Lab Technologist Program

A. Commitment to Current Program

Consumnes River College leadership indicated that they are committed to obtaining accreditation from the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) for their Ultrasound program. A new program director has been hired who is in the process of overseeing the accreditation process.

B. Accreditation of Ultrasound Program

A new program director has been hired and anticipates the needed on-site survey by JRC-DMS to occur January / February 2016 or shortly thereafter. January 2016 is when the next class, Cohort #3, is scheduled to have clinical rotations and it was indicated to be highly desirable to have the survey occur when a class could be observed in their clinical rotations. Timeline and next steps for accreditation will be updated after the site visit has occurred and the program receives a review of the findings from the JRC-DMS site visit team.

C. Vascular Lab Technologist Program

Consumnes River College leadership indicated that post accreditation of their Ultrasound Program; they would be willing to discuss with industry partners the appropriateness of enhancing their program to also include an accredited Vascular Lab Program.