San Diego Workforce Conference:
Future Employment in Our Priority Sectors

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CONSORTIUM

LIFE SCIENCES

An Employment Sector of Opportunity

San Diego Workforce Partnership, October 2014

Josh Williams, BW Research Partnership, Inc.

Life Sciences: A Sector of Opportunity

1. Introduction to the Study
2. Life Sciences Sector in San Diego County
3. Occupations in the Life Sciences
4. What does this mean for education & workforce development?

Part 1

Introduction to the Study

What are the Life Sciences?

- Life Sciences (Biotechnology) the study of living organisms to develop new products and solutions in healthcare, agriculture and sustainability.

- Nationally, the Life Sciences sector employs over 1.6 million people with wages 80% higher than the private sector average.

Life Science Subsectors

- Agricultural Feedstock & Chemicals
- Drugs & Pharmaceuticals
- Medical Devices & Equipment
- Research, Testing & Medical Laboratories
- Bioscience-Related Distribution
- M-Health or Wireless Health (emerging)

Methodology & Data Sources

1. Secondary data analysis (Centers of Excellence, EDD, BLS, EMSI, Battelle, etc.).

2. Phone & web survey of employers (n=137) & updated database of Life Science establishments in San Diego County.

3. Executive interviews with employers and industry professionals.

Why Life Sciences?

1. More recession-proof than most sectors, over the last 10 years (nationally)

2. High wages, high employment multipliers, and strong regional economic impact

3. Strong connectivity to industries (healthcare & research) and skills that are valued in the economy

4. Taking on important challenges

Part 2

The Life Sciences Sector in San Diego County

Life Sciences in San Diego County

- 45,000 jobs at approximately 1,350 establishments across the County.

- San Diego County is the #3 Life Science region in the US (#1 Greater Boston, #2 SF Bay Area).

Life Sciences in San Diego County

- Average annual wages in the Life Sciences sector is $73,000

- Over half of Life Science businesses in the County expect to increase overall employment in the next 12 months (9% growth)

Life Science Employment in San Diego County
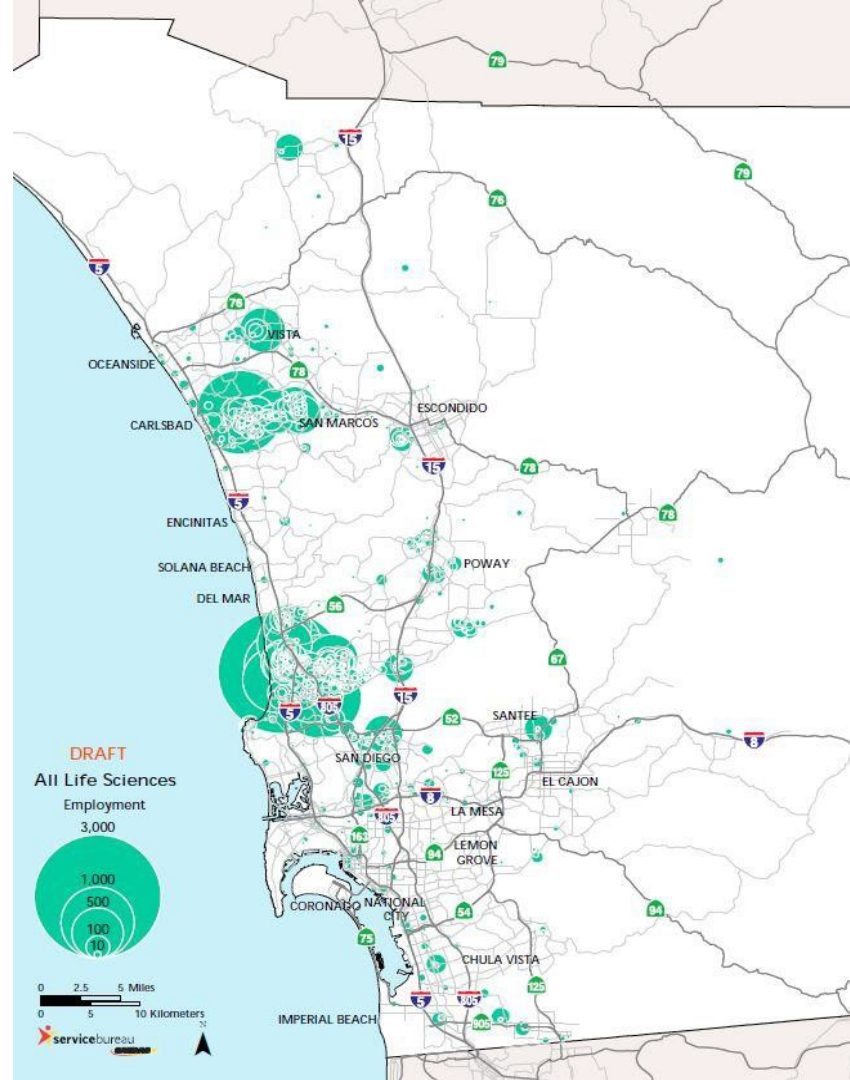
Life Science Employment
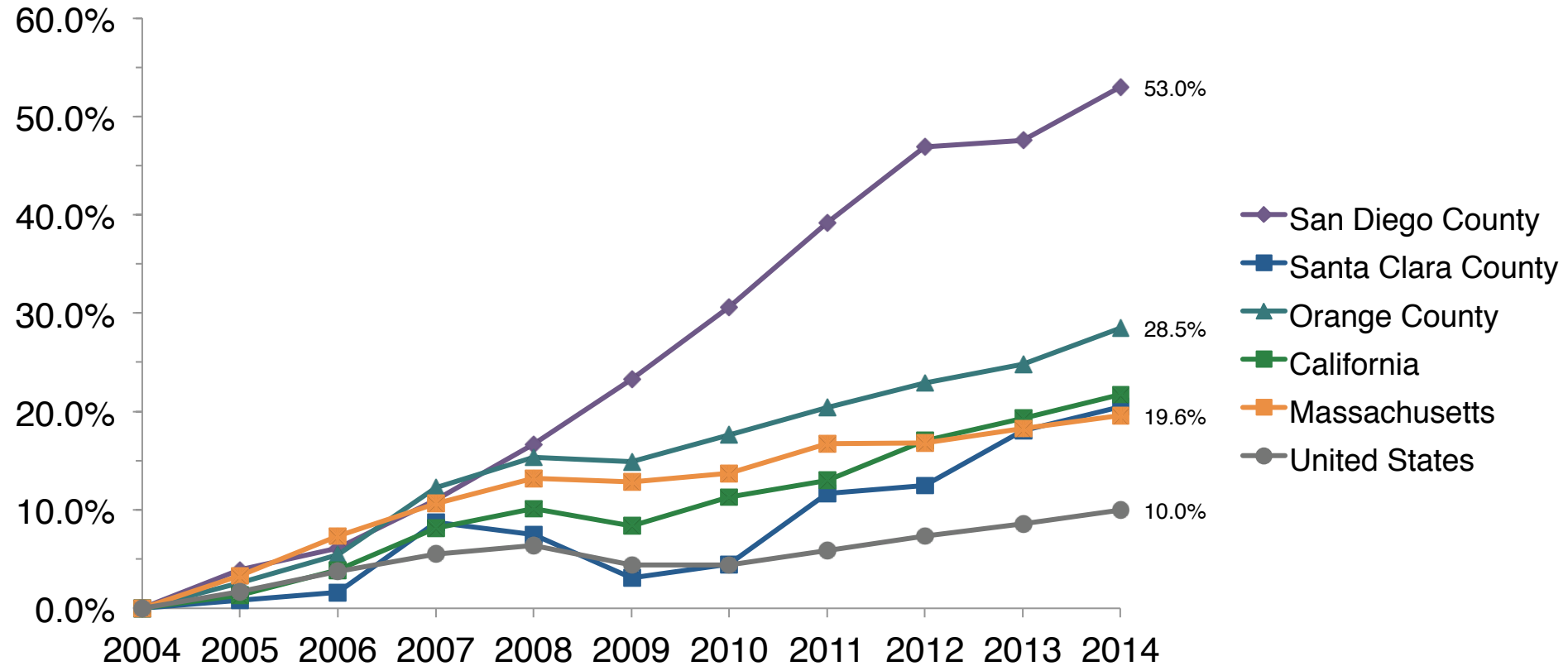
Employer Difficulty Finding Talent

■ Great Difficulty   ■ Some Difficulty   ■ Little to No Difficulty

	Great Difficulty	Some Difficulty	Little to No Difficulty
Agricultural Feedstock & Chemicals	21%	57%	22%
Multiple	24%	52%	24%
Drugs & Pharmaceuticals	5%	62%	33%
Research, Testing & Medical Laboratories	26%	37%	37%
Medical Devices & Equipment	33%	28%	39%
Other	17%	35%	48%

0%   20%   40%   60%   80%   100%
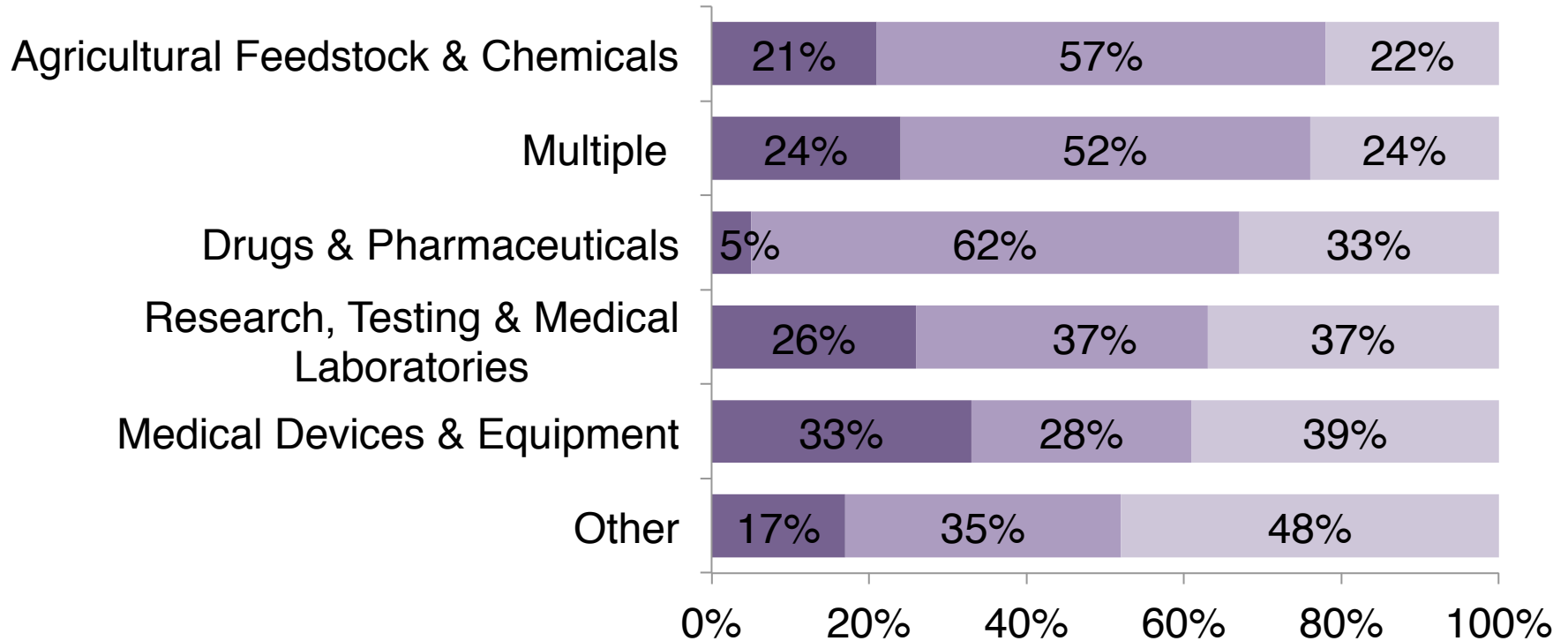
Employer Talent Needs

- 3 out of 5 employers had at least some difficulty finding qualified job applicants, especially for experienced/non-entry-level positions.

- Employers have high expectations for academic requirements, most entry-level positions require at least a 4-year college degree. (Not all meet these requirements)

Employer Talent Needs

- **Technical skills (65%)**
  - Regulatory knowledge or expertise
  - Data management, bio-informatics, IT
- **Workplace skills (17%)**
  - Attitude and ability to stay motivated
- **Industry or applied experience (17%)**
  - Sale experience or Lab experience

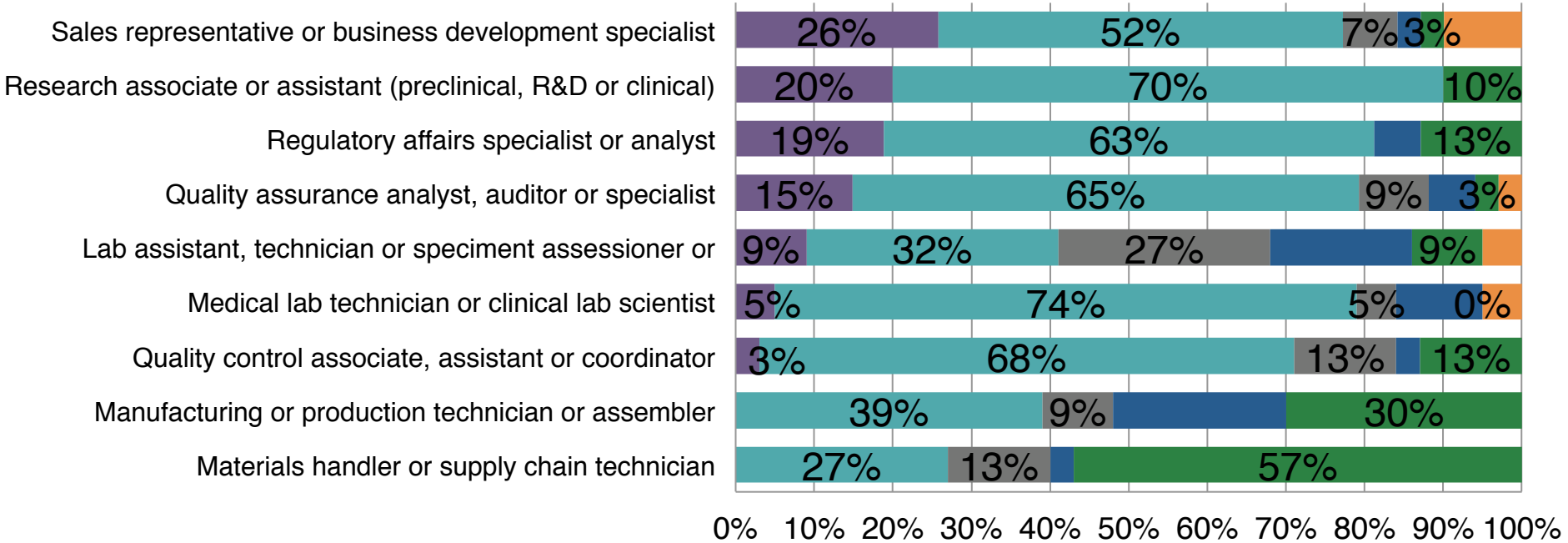# Part 3

Key Occupations in Life Sciences

9 Life Science Occupations

- Growth, employment opportunities and entry-level (4-year degree or less):
  - Regulatory affair specialist or analyst
  - Quality assurance analyst, assistant or coordinator
  - Quality control associate, assistant or coordinator

9 Life Science Occupations

- Lab assistant, technician or specimen accessioner or processor
- Manufacturing or production technician or assembler
- Materials handler or supply chain technician
- Sale representative or business development specialist
- Medical lab technician or clinical lab scientist
- Research associate or asst. (Preclinical or clinical)
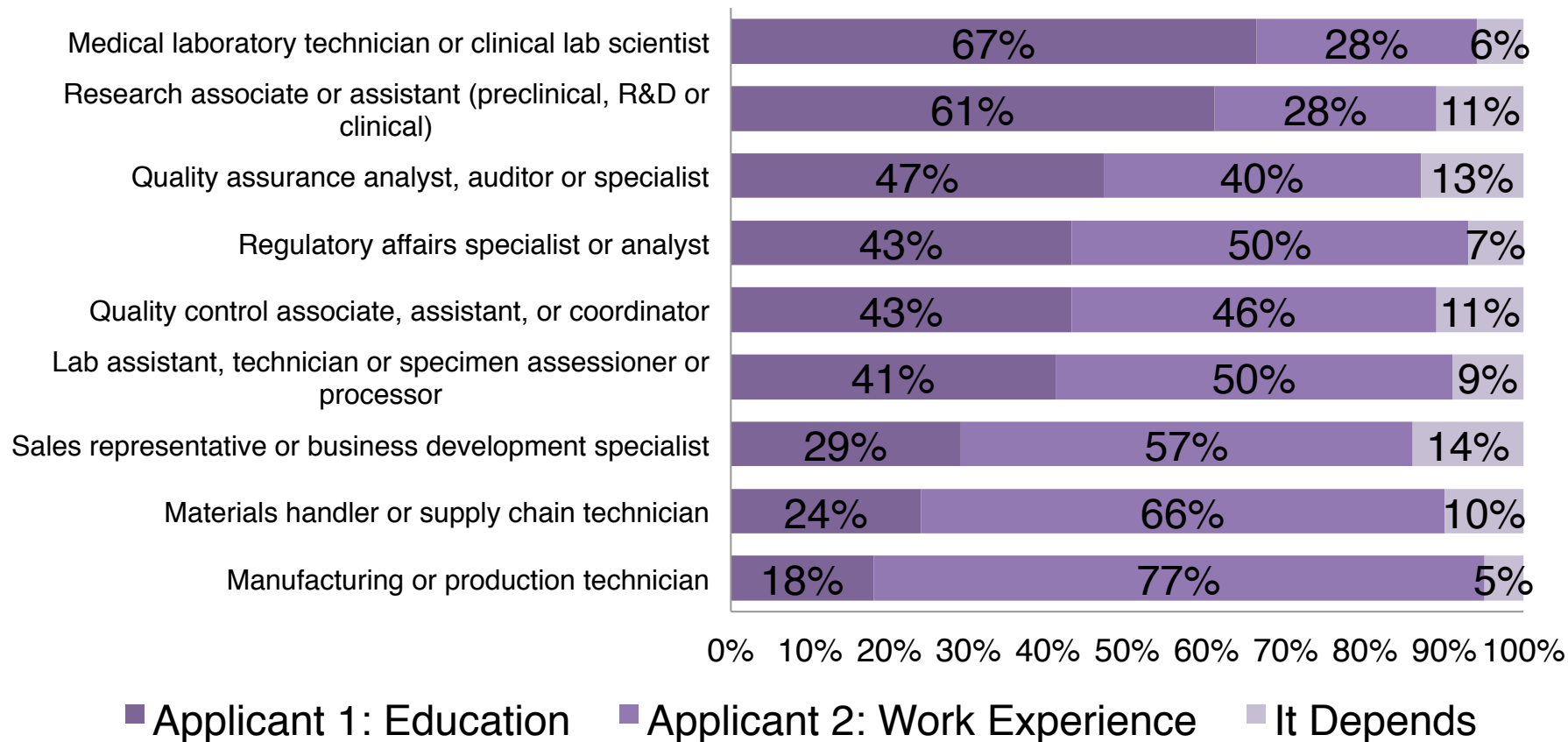
Life Science Occupations: Education

Occupation	Graduate Degree	Bachelor's Degree	Associate's Degree	Certificate	High School Diploma or Equivalent	Don't Know/NA
Sales representative or business development specialist	26%	52%	7%	3%		
Research associate or assistant (preclinical, R&D or clinical)	20%	70%			10%	
Regulatory affairs specialist or analyst	19%	63%			13%	
Quality assurance analyst, auditor or specialist	15%	65%	9%	3%		
Lab assistant, technician or speciment assessioner or	9%	32%	27%		9%	
Medical lab technician or clinical lab scientist	5%	74%	5%	0%		
Quality control associate, assistant or coordinator	3%	68%	13%		13%	
Manufacturing or production technician or assembler		39%	9%		30%	
Materials handler or supply chain technician		27%	13%		57%	

Legend:
- Graduate Degree
- Bachelor's Degree
- Associate's Degree
- Certificate
- High School Diploma or Equivalent
- Don't Know/NA

Education and Difficulty Hiring

Employee Education Factor Requirements (y-axis)
Difficulty Hiring Index (x-axis)

- (1) Materials handler or supply-chain technician (739 jobs)
- (2) Quality assurance analyst, auditor or specialist (909 jobs)
- (3) Quality control associate, assistant or coordinator (826 jobs)
- (4) Medical lab technician or Clinical lab scientist (1,718 jobs)
- (5) Manufacturing or production technician or assembler (1,325 jobs)
- (6) Regulatory affairs specialist or analyst (902 jobs)
- (7) Lab assistant, technician or specimen assessioner or processor (1,928 jobs)
- (8) Research associate or assistant (Preclinical, R&D or Clinical) (1,767 jobs)
- (9) Sales representative or business development specialist (1,152 jobs)

Technical Skills vs. Academic Foundation

Role	Applicant 1: Education	Applicant 2: Work Experience	It Depends
Medical laboratory technician or clinical lab scientist	67%	28%	6%
Research associate or assistant (preclinical, R&D or clinical)	61%	28%	11%
Quality assurance analyst, auditor or specialist	47%	40%	13%
Regulatory affairs specialist or analyst	43%	50%	7%
Quality control associate, assistant, or coordinator	43%	46%	11%
Lab assistant, technician or specimen assessioner or processor	41%	50%	9%
Sales representative or business development specialist	29%	57%	14%
Materials handler or supply chain technician	24%	66%	10%
Manufacturing or production technician	18%	77%	5%

Employer Input on Occupations

- A strong academic foundation in science is necessary but not sufficient for a majority of the 9 occupations.

- The pipeline for these occupations needs to be developed, in terms of academic foundation, technical skills and workplace skills.

Part 4

What does this mean for Education & Workforce Development?

Life Sciences in San Diego County

- Has had ***strong*** growth and is expected to continue growing.

- Employers require educated, technically skilled employees, **that largely cannot be developed quickly**.

- Employers are currently **facing difficulty** finding qualified applicants (particularly experienced) in a relatively loose labor market.

Expand and Improve Talent Pipeline

- **Start earlier**: Develop programs and resources that expose youth to opportunities in Life Sciences.

- **Identify and assess** job candidates for entry-level occupational training for positions such as production technician/assembler or lab assistant.

Expand and Improve Talent Pipeline

- **Develop workforce & education tools** to provide feedback on evolving nature of employment, this could include:
  - Skills & technology dashboard
  - Updated career pathways with academic, technical & workplace skill requirements
  - Sub-sector employment mapping & database

Education & Workforce Investments

- **K-12**: Provide science foundation and offer collaborative educational models that expose students to industry opportunities.

- **Community Colleges**: Continue science education and provide technical training for incumbent and inexperienced job-seekers (example: Southern California Biotechnology Center)

Education & Workforce Investments

- **Public & Private Universities**: Complete the science education, continue to collaborate on the commercializing of new research and consider training & education programs in:
  - Regulatory affairs (science & policy in the process)
  - Bio-informatics and data analysis focused on LS
  - Biomedical engineering and its applications

Support for Students & Job-Seekers

Great employment opportunities in Life Sciences for those with:

- **Passion to solve big problems** & the ability to learn

- **Scientific foundation** with ability to communicate technical information

- Willingness to work in an **evolving fast-paced environment**

Questions, Comments & Feedback

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HEALTH CARE

Labor Market Analysis

October 2, 2014

Zhenya Lindstrom, Center of Excellence for Labor Market Research
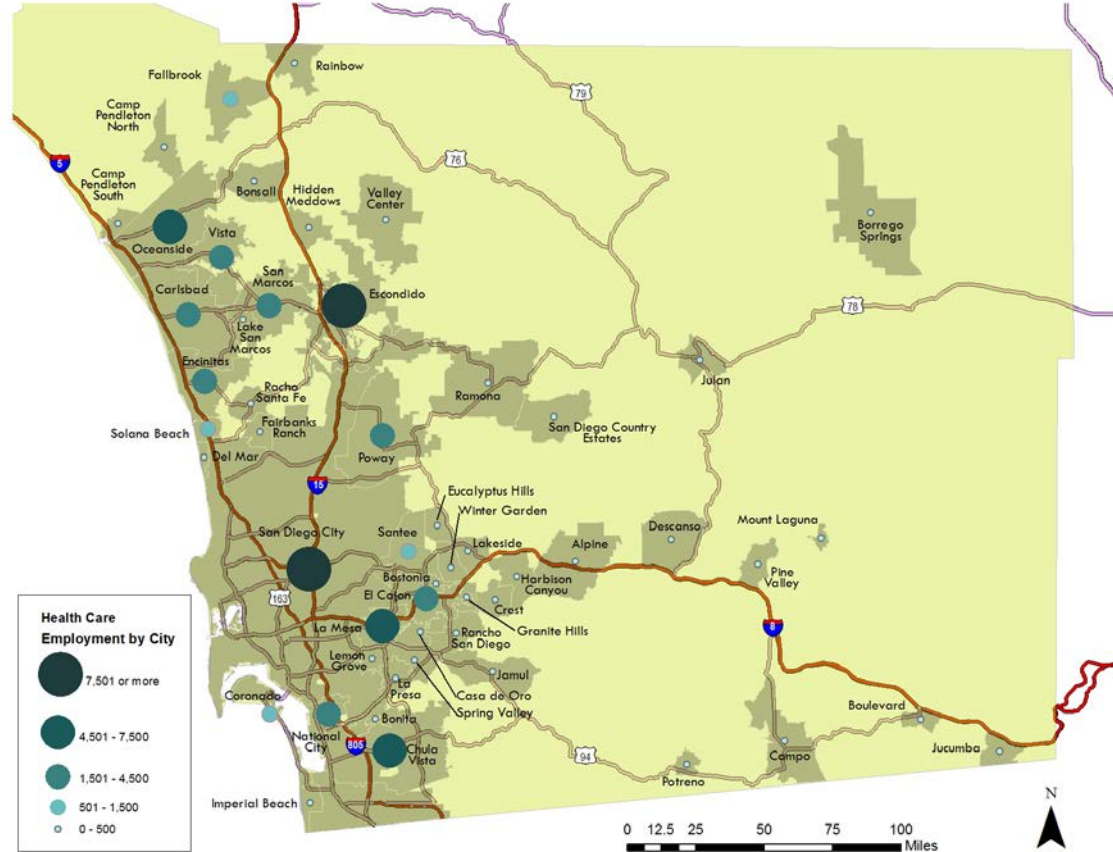San Diego/Imperial Region

Health Care Sector

- 18 million workers in U.S.

- Over 100,000 Health Care workers in San Diego County

- Recession-proof in San Diego

- 1 in 10 jobs in San Diego is health services-related

Sector Definition

- Hospitals
- Ambulatory Care
- Nursing & Long-term Care

Study Methodology

- **CHA/HASC Survey**
  - 4th Quarter of 2014
  - 16 hospitals
- **HWI/COE Survey**
  - All of 2013
  - 178 ambulatory & long-term care establishments
- **Literature Review**
- **Secondary LMI Data Sources**
  - EMSI, Burning Glass
- **Program Data**
  - CCCCO Data Mart, IPEDS

Industry Trends

- Policies & regulations
  - Affordable Care Act
  - ICD-10-CM standard
- Emphasis on health & wellness
- Technological innovations
  - Remote and self-monitoring systems
- Changes in service delivery
  - Team-based patient care
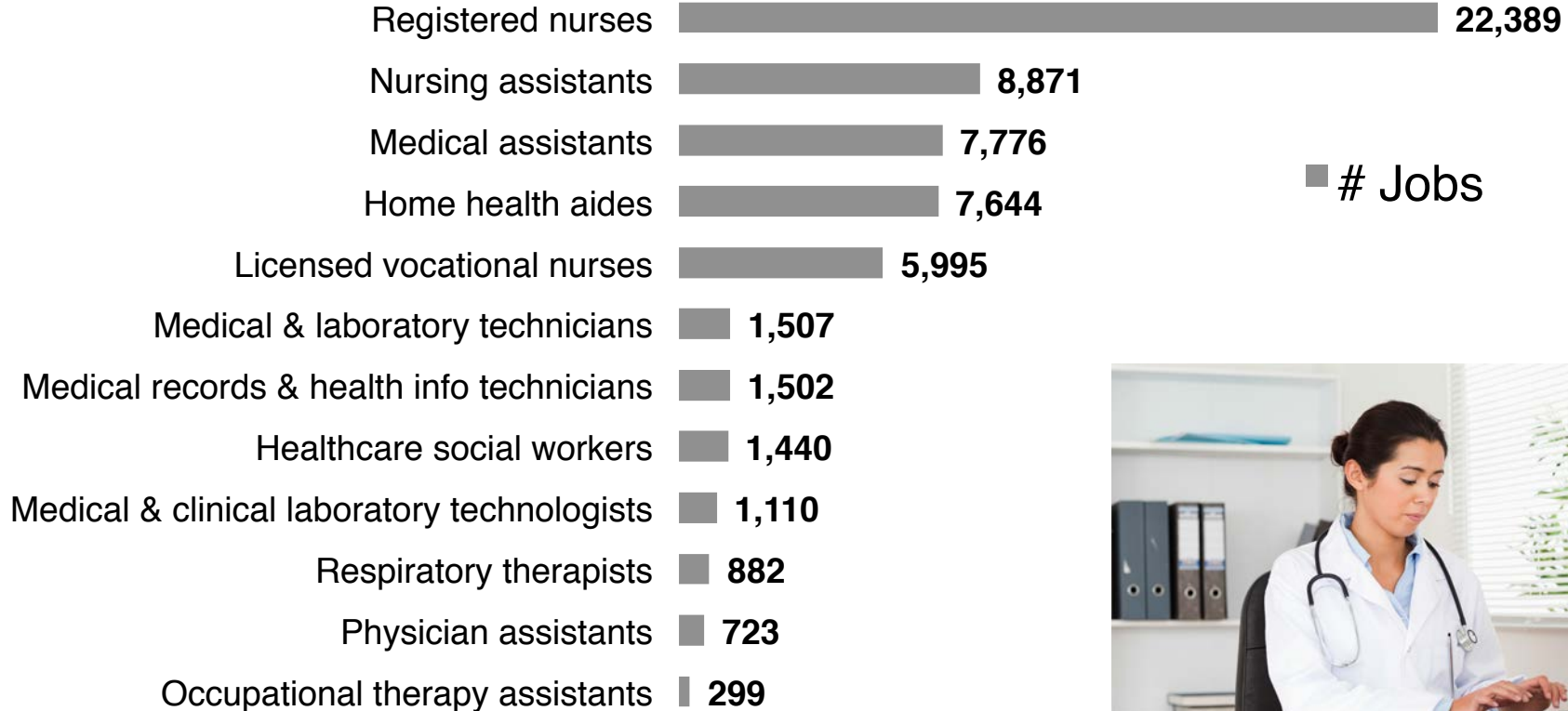 - Patient centered care
  - Patent advocacy

New skills and education requirements
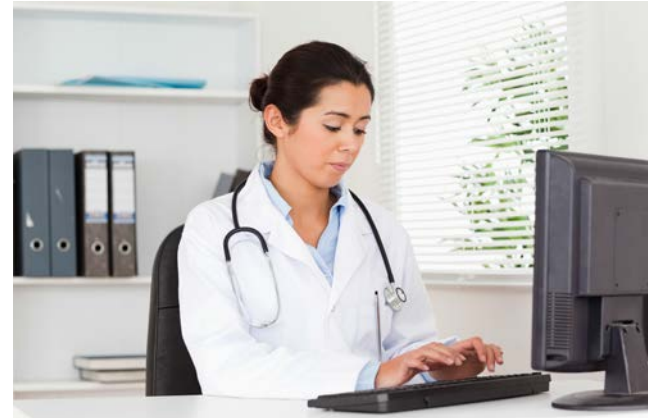
Higher employer expectations

Occupations Studied

- Registered nurses
- Licensed vocational nurses
- Medical assistants
- Home health aides
- Medical coders
- Occupational therapy assistants

- Medical laboratory technicians
- Health care social workers
- Clinical laboratory scientists
- Respiratory therapists
- Physician assistants
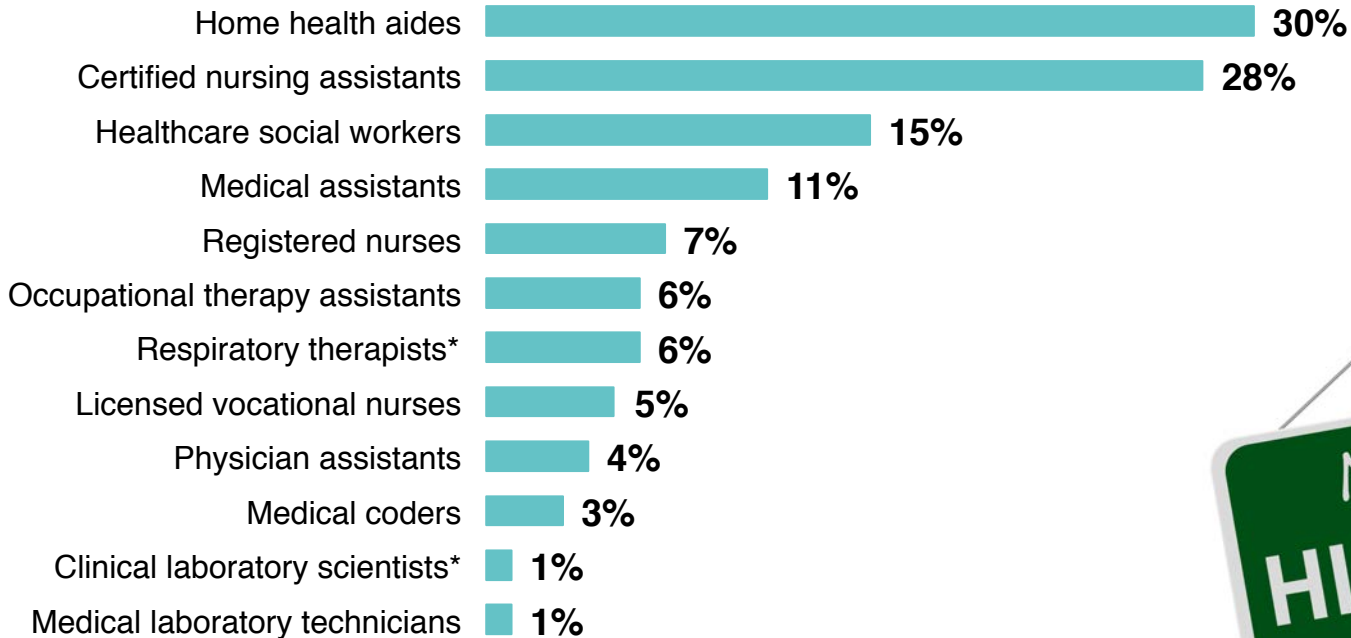- Nursing assistants

Occupational Employment

Occupation	# Jobs
Registered nurses	22,389
Nursing assistants	8,871
Medical assistants	7,776
Home health aides	7,644
Licensed vocational nurses	5,995
Medical & laboratory technicians	1,507
Medical records & health info technicians	1,502
Healthcare social workers	1,440
Medical & clinical laboratory technologists	1,110
Respiratory therapists	882
Physician assistants	723
Occupational therapy assistants	299

■ # Jobs

Source: EMSI

Occupational Employment

Measure of annual demand (new & replacement jobs)

Occupations	San Diego County				Imperial County			
	2013 Jobs	2018 Jobs	5-Year Change	Annual Openings	2013 Jobs	2018 Jobs	5-Year Change	Annual Openings
Registered nurses	22,389	24,197	1,808	822	1,039	1,140	101	42
Home health aides	7,644	9,157	1,513	470	677	879	202	56
Nursing assistants	8,871	10,250	1,379	460	237	272	35	12
Medical assistants	7,776	8,660	884	340	179	209	30	10
Licensed vocational nurses	5,995	6,743	748	308	215	240	25	11
Medical & clinical lab technicians	1,507	1,830	323	109	48	54	6	2
Medical coders	1,502	1,681	179	78	98	106	8	4
Clinical laboratory scientists	1,110	1,302	192	70	34	37	3	--
Healthcare social workers	1,440	1,608	168	66	76	96	20	2
Physician assistant	723	861	138	43	11	15	4	--
Respiratory therapists	882	958	76	29	24	26	2	--
Occupational therapy assistants	299	355	56	20	<10	<10	--	--
Total	**60,137**	**67,603**	**7,466**	**2,815**	**2,643**	**3,078**	**435**	**146**

Source: EMSI

Employment Growth

Ambulatory & Long-Term Care
Average Projected 12-month Growth

Home health aides	30%
Certified nursing assistants	28%
Healthcare social workers	15%
Medical assistants	11%
Registered nurses	7%
Occupational therapy assistants	6%
Respiratory therapists*	6%
Licensed vocational nurses	5%
Physician assistants	4%
Medical coders	3%
Clinical laboratory scientists*	1%
Medical laboratory technicians	1%

Source: HWI/COE Survey

Now HIRING

Hiring Difficulties
by Ambulatory Care & Long-Term Care Employers

■ Great difficulty ■ Some difficulty ■ No difficulty

Role	Great difficulty	Some difficulty	No difficulty
Occupational therapy assistants	20%	27%	53%
Physician assistants	16%	28%	56%
Medical coders	11%	42%	47%
Medical assistants	9%	48%	42%
Clinical laboratory scientists	8%	46%	46%
Home health aides	7%	45%	48%
Social workers	5%	51%	43%
Medical laboratory technicians	5%	45%	50%
Registered nurses	4%	47%	49%
Certified nursing assistants	2%	43%	55%
Licensed vocational nurses	2%	40%	58%
Respiratory therapists		20%	80%

0%   25%   50%   75%   100%

Source: HWI/COE Survey

Health Care Workers: Wages

Occupation	San Diego County	Imperial County
Physician assistants	$46.88	N/A
Registered nurses	$41.53	$32.61
Clinical laboratory scientists	$35.47	$38.07
Occupational therapy assistants	$33.79	N/A
Respiratory therapists	$32.24	$27.26
Health care social workers	$28.30	$34.61
Licensed vocational nurses	$23.38	$24.10
Medical laboratory technicians	$20.32	$13.37
Medical coders	$18.54	$17.90
Medical assistants	$16.12	$11.54
Certified nursing assistants	$13.15	$11.21
Home health aides	$10.85	$8.51

■ San Diego County
■ Imperial County

Health Care Workers: Age

■ Under 34   ■ Age 35-54   ■ Age 55+

	Under 34	Age 35-54	Age 55+
Registered nurses	25%	52%	23%
Licensed vocational nurses	28%	49%	23%
Medical records & health info technicians	32%	46%	23%
Healthcare social workers	33%	46%	21%
Home health aides	38%	42%	20%
Medical & clinical laboratory technologists	35%	47%	19%
Respiratory therapists	27%	54%	19%
Nursing assistants	38%	44%	19%
Medical & clinical laboratory technicians	37%	46%	18%
Physician assistants	38%	48%	15%
Medical assistants	49%	39%	12%
Occupational therapy assistants	42%	47%	11%

Health Care Workers: Gender

	Female	Male
Medical assistants	89%	11%
Occupational therapy assistants	86%	14%
Licensed vocational nurses	84%	16%
Home health aides	82%	18%
Medical records & health info technicians	82%	18%
Registered nurses	80%	20%
Nursing assistants	79%	21%
Healthcare social workers	74%	26%
Medical & clinical laboratory technicians	66%	34%
Medical & clinical laboratory technologists	66%	34%
Respiratory therapists	65%	35%
Physician assistants	59%	41%

Knowledge, Skills & Abilities

- Team-based approach
- Clinical experience
- Customer-focused approach
- Computer skills
- Record-keeping
- Communication
- Problem-solving & critical thinking
- Leadership
- Quality control
- Ability to instruct & educate

Education & Training Providers

Postsecondary Program Completers, 2012-2013
in San Diego County

Certificates	Associate Degrees	Bachelor's Degrees	Total Completions
2,452	1,044	728	4,224

in Imperial County

Certificates	Associate Degrees	Bachelor's Degrees	Total Completions
24	59	21	104

Sources: CCCCO DataMart, IPEDS

Education & Training Providers

San Diego County

Occupation	Certificates	Associate Degrees	Bachelor's Degrees	Total Completions
Medical assistants	1,212	210	0	1,422
Registered nurses	71	511	686	1,268
Medical coders	355	33	0	388
Licensed vocational nurses	352	10	19	381
Respiratory therapists	32	212	19	263
Certified nursing assistants	212	0	0	212
Home health aides	195	0	0	195
Medical & clinical lab technicians	22	20	0	42
Health care social workers	1	29	0	30
Occupational therapy assistants	0	19	0	19
Clinical laboratory scientists	0	0	4	4
Physician assistants	0	0	0	0
Total	2,452	1,044	728	4,224

Training Gap Analysis

San Diego County

Avg. Annual Job Openings	Avg. Annual Graduates	Difference (Over/ Under-Supply)
2,815	4,224	+1,409

Imperial County

Avg. Annual Job Openings	Avg. Annual Graduates	Difference (Over/ Under-Supply)
146	104	-35

Training Gap Analysis: Detail

San Diego County

Occupation	Over/Under-Supply
Medical assistants	1,082
Registered nurses	446
Medical coders	310
Respiratory therapists	234
Licensed vocational nurses	73
Occupational therapy assistants	-1
Health care social workers	-36
Physician assistants	-43
Clinical laboratory scientists	-66
Medical & clinical lab technicians	-67
Certified nursing assistants	-248
Home health aides	-275

Recommendations for
Workforce Dev't & Education

1. Increase **education completion rates** to address shortages

2. **Review curriculum** to ensure it meets employers' needs

3. Invest in laboratory **equipment & software** upgrades

4. Address **soft skills** shortfalls in curriculum development

5. Create **externship programs** between incumbent Health Care workers and students

6. Provide either clinical **work experience** or other types of work experience to students

7. Facilitate **seamless pathways** for students from HS to CCs to 4-year institutions

Recommendations for Additional Research

1. Explore National Council Licensure Examination (NCLEX-RN) data for registered nurses

2. Conduct further analysis of survey data to estimate employment numbers & projections to supplement traditional labor market information

Q & A

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CLEAN ENERGY

Overview

Part 1
Clean Energy Methodology & Definitions

Part 2
Key Findings

Part 3
Conclusions

Part 4
Recommendations

Part 1

Clean Energy Research Process

Clean Energy Definition

Clean Energy Firm

A firm that is directly involved with renewable energy (e.g., solar, wind, biomass, etc.) or energy efficiency (e.g., lighting, weatherization, appliances, etc.). Other clean energy segments were not included in the study because they are too small in San Diego County.

Clean Energy Job

Any worker at a clean energy firm who spends at least a portion of his or her time supporting the clean energy portion of the business.

Focus on Installation

This study focused on sales and installation and does not include manufacturing, R&D, etc.

Selected Occupations

- Photovoltaic installers
- HVAC technicians
- Construction or project managers
- Energy auditors
- Sales representatives
- Solar water heater installers
- Photovoltaic designers
- Weatherization specialists
- Plumbers
- Documentation specialists
- Electricians
- Battery installation specialists
- Wind turbine technicians
- Wind blade installers/repairers
- Construction equipment operators

Existing Data & Limitations

Secondary Data Bureau of Labor Statistics (BLS), Employment Development Dept (EDD)

These sources have no current, clean energy specific data, because the occupations and industries overlap with traditional sectors (e.g., electrical contractors, HVAC technicians, etc.)

Full-Time Employees (FTEs) are a Challenge

Workers install products based on consumer demand. Most employers work across the spectrum of clean and traditional activities.

Training is Varied

There is not a consistent approach to training in clean fields. Some include "clean" in a traditional program, others have separate modules.

Our Approach

Staffing Patterns

A review of the types of occupations and industries most likely to hire clean energy installation workers.

Employer Surveys and Interviews

Responses from 565 employers with 290 full completions.

Education and Training Survey

Review of clean energy programs in the region.

Part 2

Research Findings

The Hype Cycle
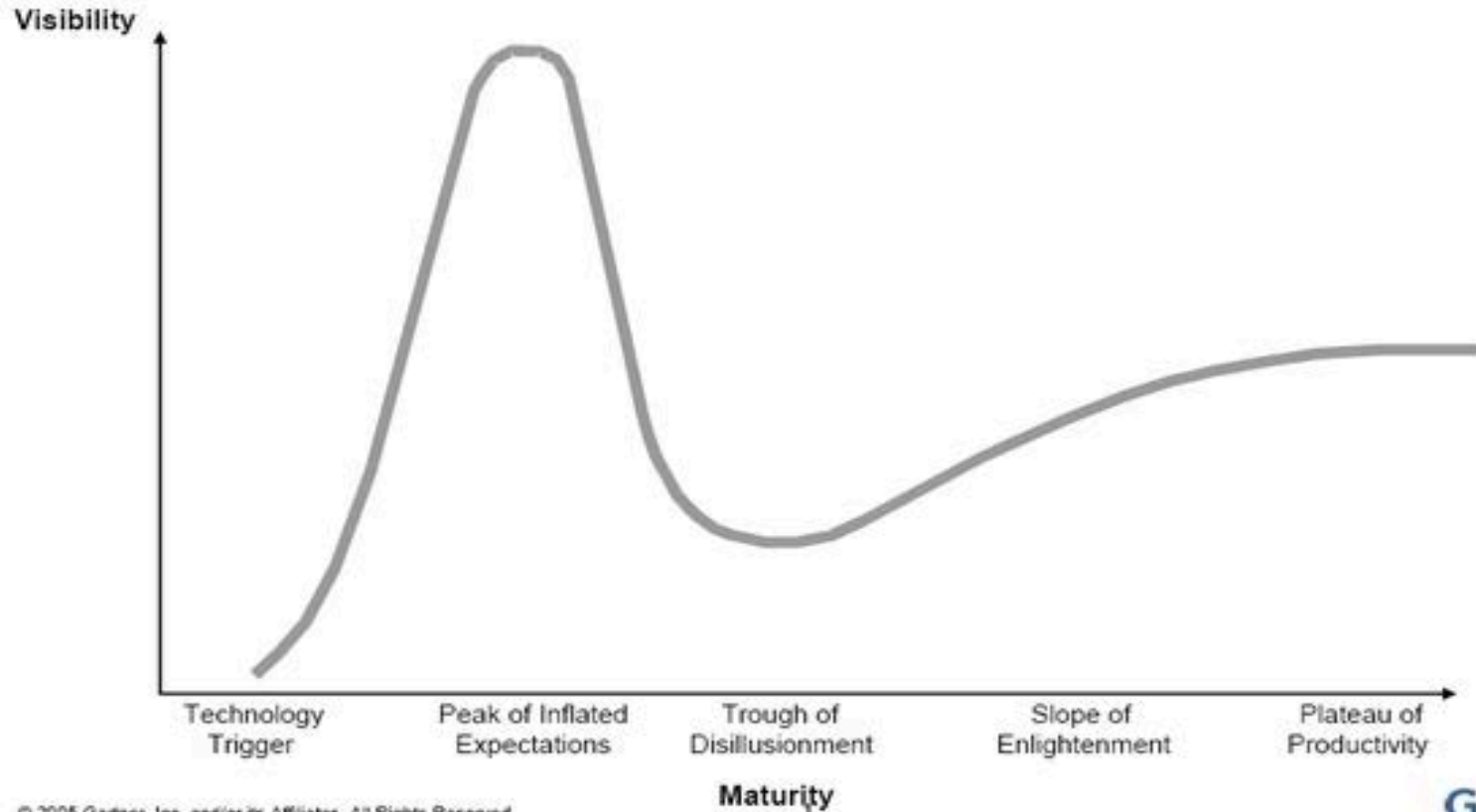
Very Low Difficulty Hiring

Nearly 2/3 of employers face no difficulty hiring

Yes, great difficulty, 8%

Yes, some difficulty, 27%

No difficulty, 65%

Despite Strong Growth

Refused
7.9%

Fewer
0.7%

Same
number
56.9%

More
34.5%

11.5%
growth

28,597

31,882

40,000

30,000

20,000

10,000

0

2014

2015 Projected

Clean Energy Workers
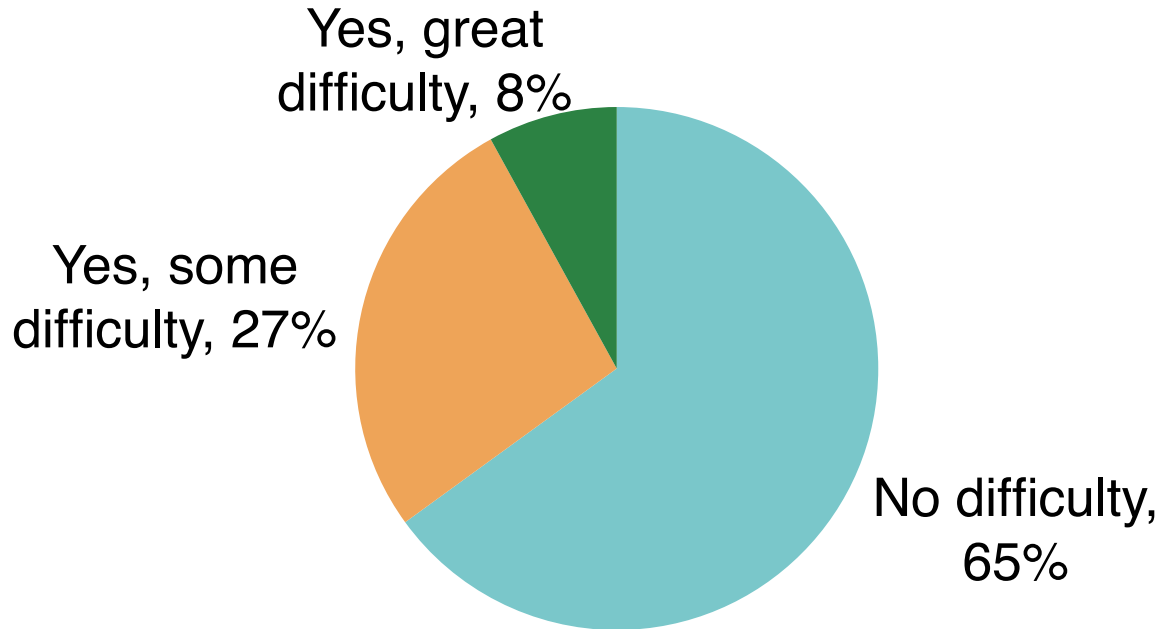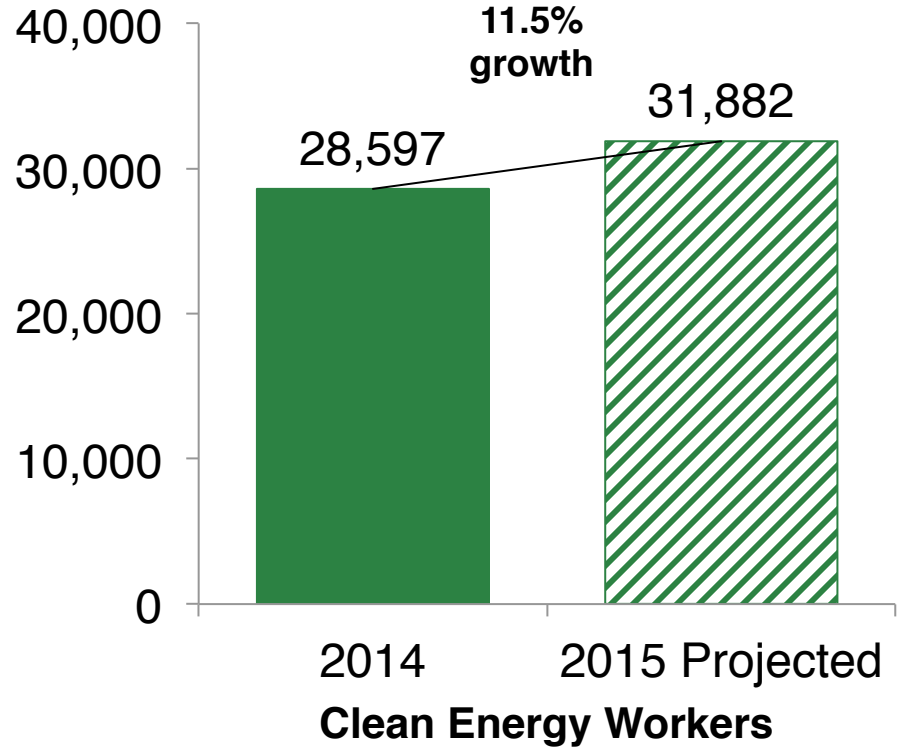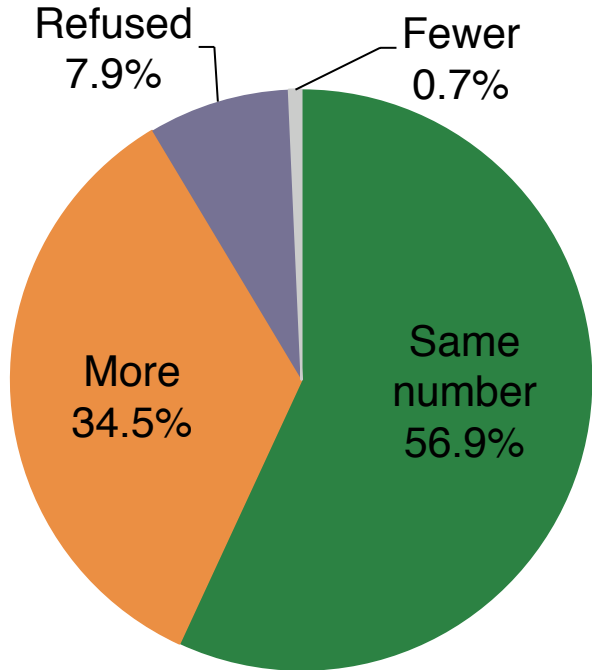
And Training Gaps

Suggesting Large Pool

Chart legend: ■ Construction Jobs — % Change

Left axis (Total Jobs): 0; 20,000; 40,000; 60,000; 80,000; 100,000; 120,000

Right axis (% Change from 2007): 0%; -5%; -10%; -15%; -20%; -25%; -30%; -35%

Years: 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014
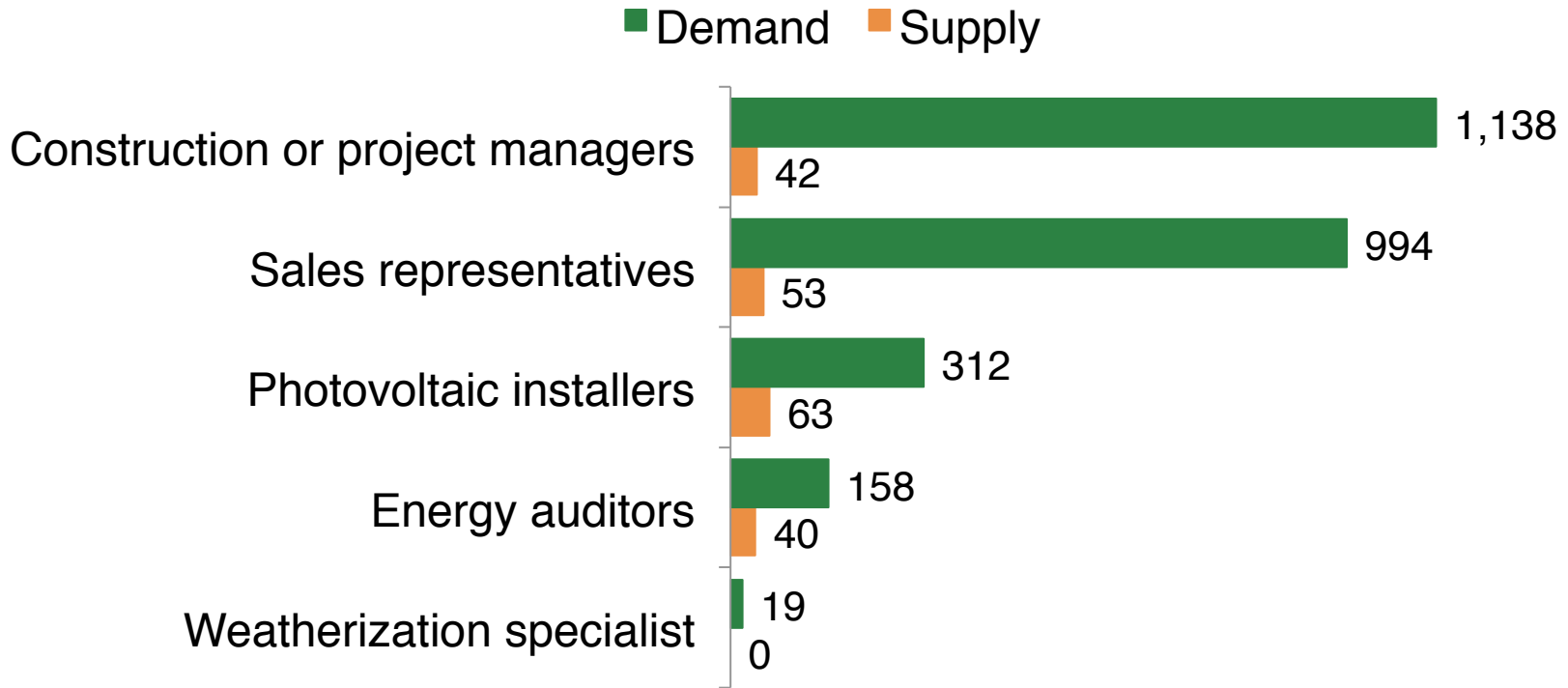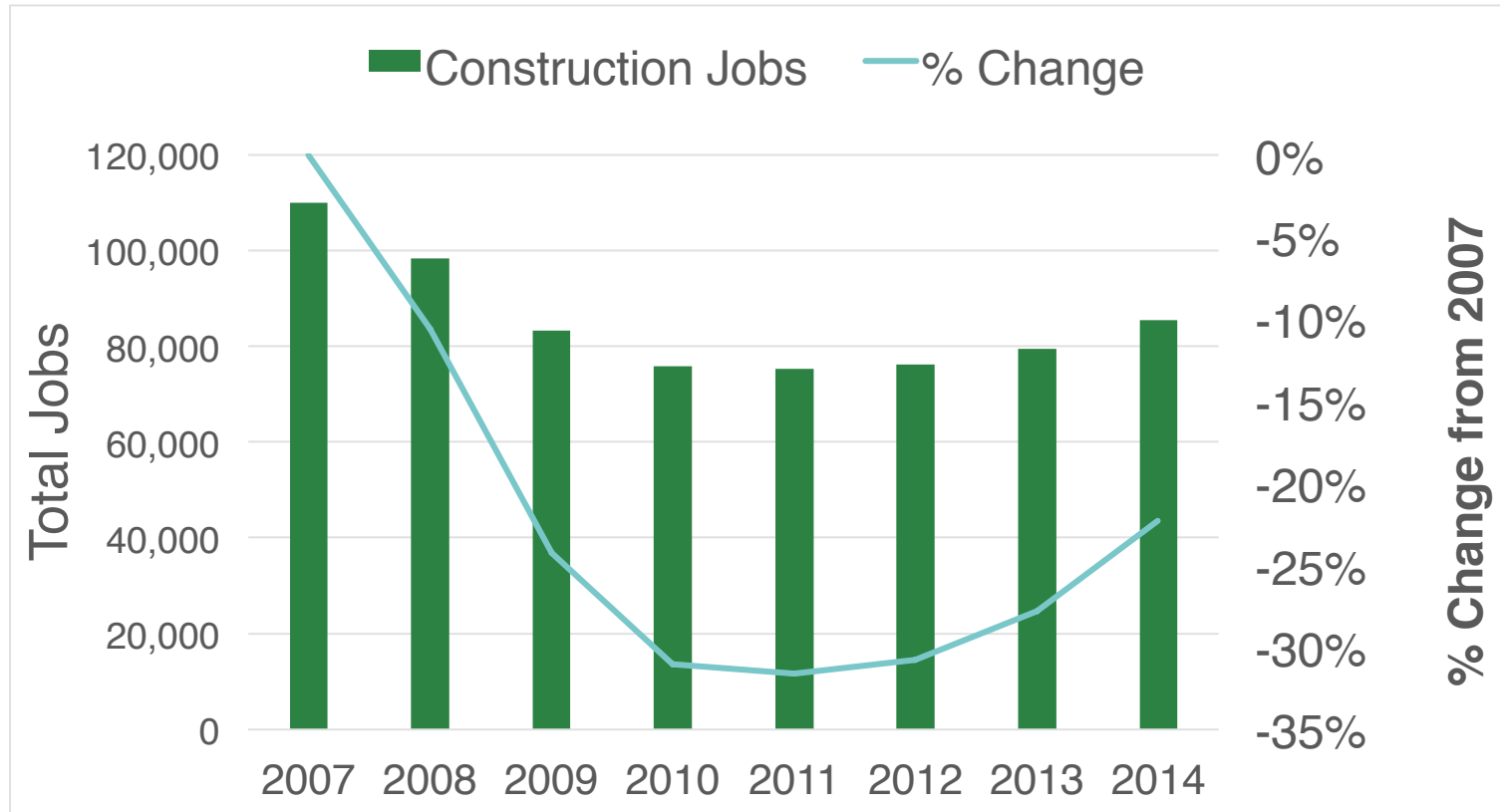
Part 3

Conclusions

Strong Growth in Renewables and Efficiency

- 11.5% Projected Annual Growth Overall

- Solar is a Major Driver
  - County is #2 in total capacity and more than 3,500 solar jobs (adding 550 this year)

- Efficiency is Key
  - Most businesses and jobs are working with energy efficiency goods

Competitive Job Market

- Low difficulty
- Many unemployed tradespeople
- Long-term challenges for applicants
- Good news for business attraction

Employers Seek Experienced Workers

Category	Percentage
Require	53.2%
Prefer	39.8%
Do not require or prefer	4.8%
No response	2.2%
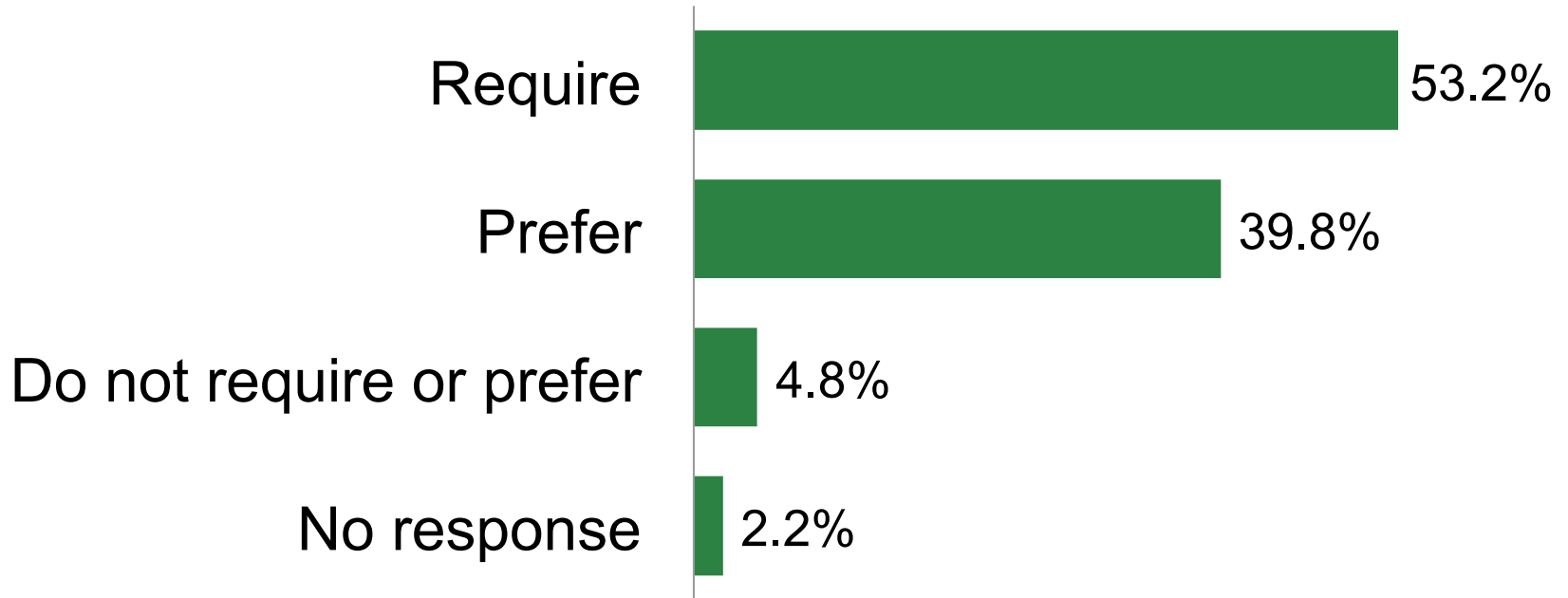
Education Requirements Vary

Preferred level of Education or Training for New Hires	With Previous Work Experience	Without Previous Work Experience
Technical certification from a college but not a degree	21.0%	17.1%
Bachelors degree or higher	15.6%	17.1%
Technical certification from a high school but no college	12.0%	12.1%
Non-technical high school diploma or GED	12.0%	16.4%
Union apprenticeship training	10.2%	5.7%
Associates degree, but not a bachelors degree or higher	6.6%	10.7%
None of the Above	18.0%	17.9%
Don't know/Not applicable	4.8%	2.9%

Some Skill Gaps Exist

Legend: ■ Great difficulty ■ Some difficulty

Category	Some difficulty	Great difficulty
Problem solving	63.3%	16.5%
Written communication	43.1%	13.8%
Oral communication (speaking & listening)	44.0%	11.9%
Applied mathematics	44.0%	9.2%
Teamwork and collaboration	41.3%	8.4%
Basic computer literacy	38.5%	8.3%
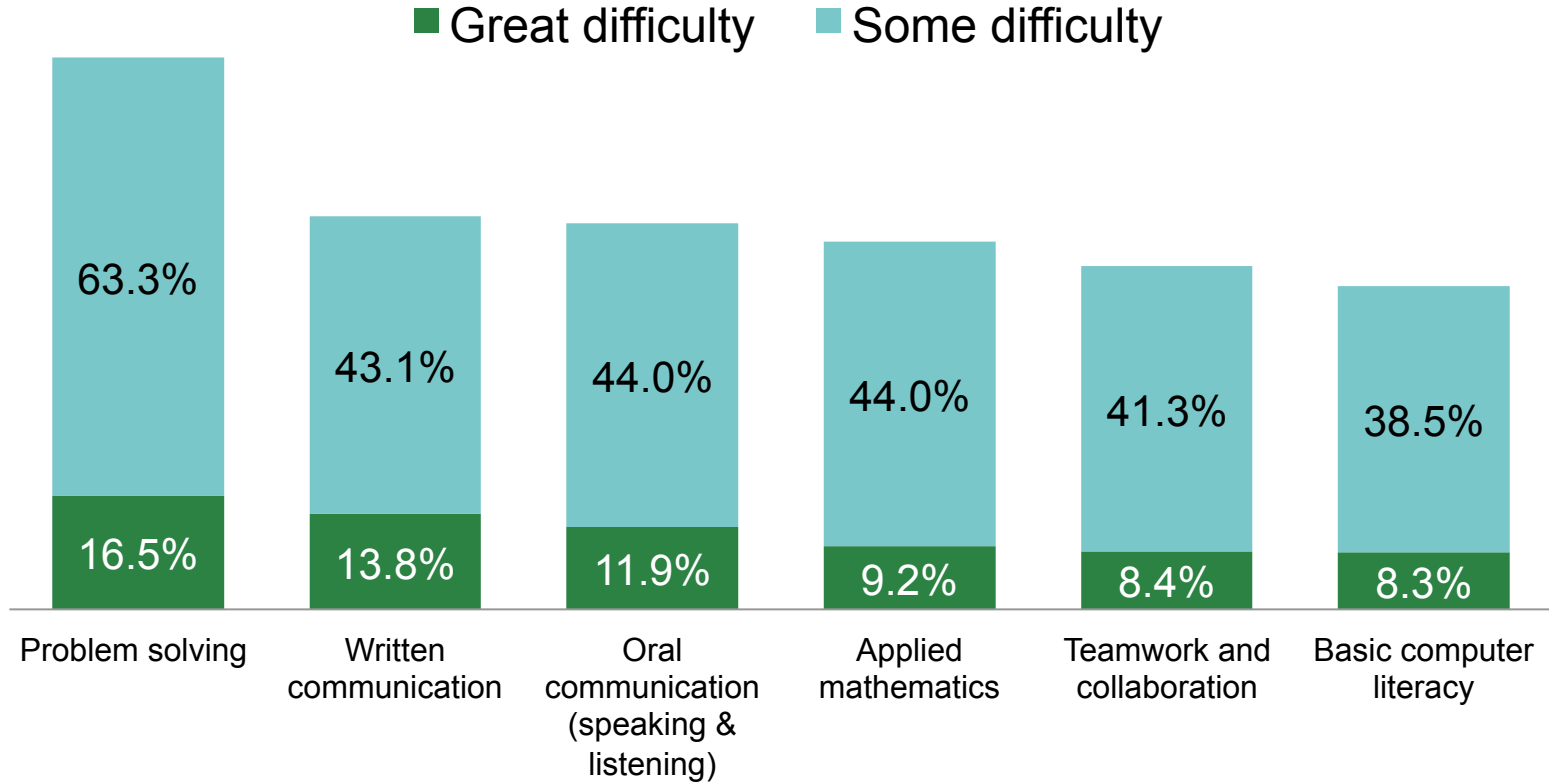
Part 4

Workforce Recommendations

Focus on Quality and Experience

- Limit overall enrollment, especially for inexperienced
- Develop modules for existing programs
- Incorporate academic, technical and workplace skills
- Provide cross-training
- Recruit experienced (dislocated) workers
- Offer incumbent worker training
- Incorporate experience (apprenticeship/internship)
- Offer college credit

Specific Opportunities

- Sales and management programs are needed

- Focus on customer service and calculating and explaining return on investment

- Incorporate solar design into existing AutoCAD

- Engage with employers on specific needs (especially small businesses)

- Allocate necessary time for business development

Funding Checklist

Read the report for a detailed funding checklist!

workforce.org/industry-reports

Questions?

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San Diego Workforce Conference:
Future Employment in Our Priority Sectors

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San Diego's Advanced Manufacturing careers today are
diverse & **complex**
Demanding high-tech skills in
computer,
high precision,
robotics,
and **information technologies.**

This Report

Documents opportunities for the Advanced Manufacturing sector in the region and identifies the specifications **employers** and **educators** need to address to assure that the workforce has the *skills* and *knowledge* required to maintain and grow this high-value added sector.

Key Findings

- Advanced Manufacturing is a major sector in the San Diego region that is expected to grow

ADVANCED MANUFACTURING SECTOR PROJECTED EMPLOYMENT GROWTH

| 2013 EMPLOYMENT 170,800 | → | 2018 EMPLOYMENT 180,700 | = | 6% INCREASE IN JOBS |

- Employers reported "Some" or "Significant Difficulty" finding qualified workers for many occupations
- The cost and complexity of training requirements make it difficult for educators to design targeted curriculum

Value of Advanced Manufacturing to San Diego Economy

- 10% of all enterprises
- 15% of all paid employment
- 22% of annual regional payroll
- 23% of gross regional product

GROSS REGIONAL PRODUCT (GRP)
SAN DIEGO COUNTY
(IN MILLIONS)

■ Advanced Manufacturing GRP   ■ GRP of other sectors

Total GRP

	2007	2008	2009	2010	2011	2012
GRP of other sectors	$126,728	$128,368	$125,908	$126,644	$130,380	$135,941
Advanced Manufacturing GRP	$39,289	$39,364	$37,736	$37,231	$39,508	$41,469
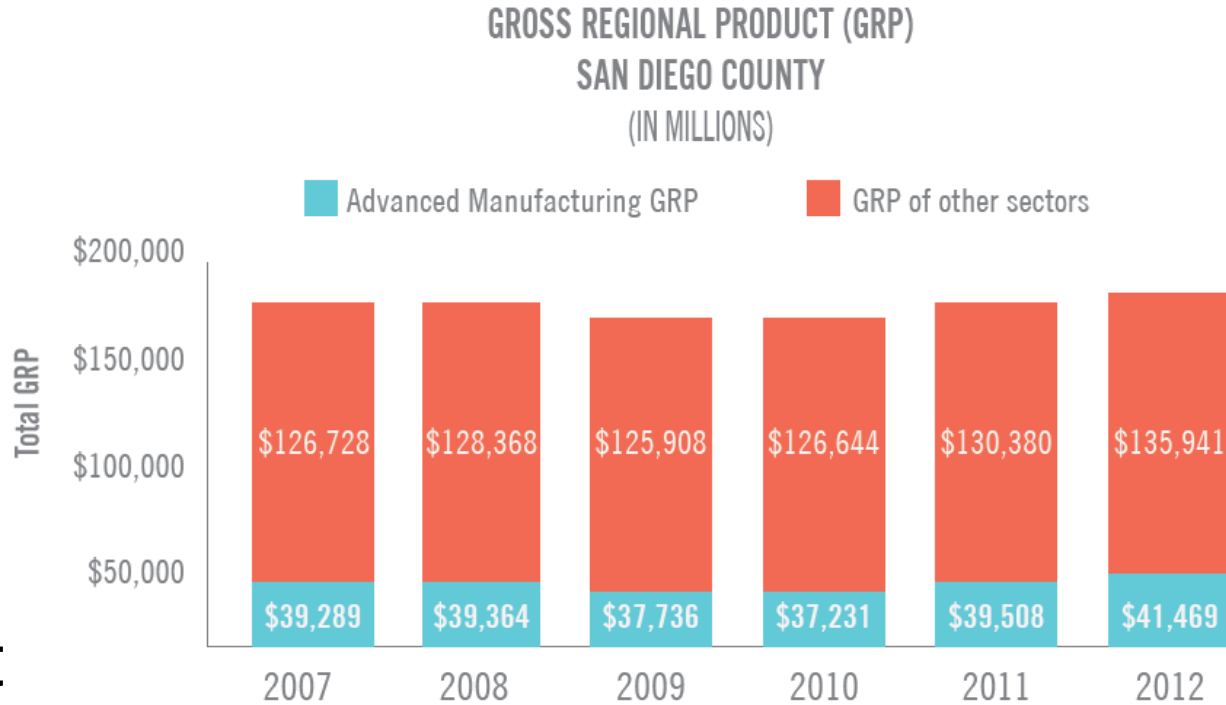
SIZE OF ADVANCED MANUFACTURING ESTABLISHMENTS BY NUMBER OF EMPLOYEES
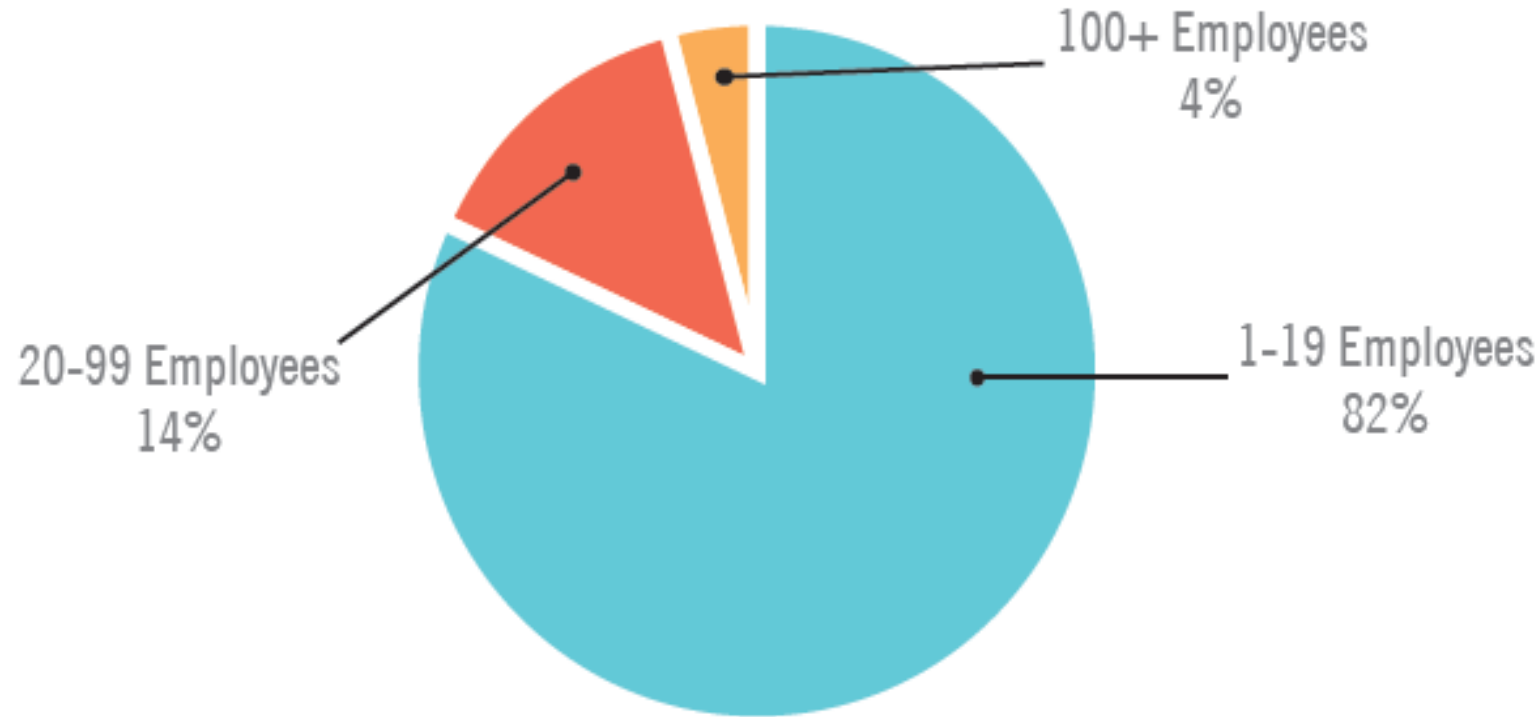
Top Business Functions of Advanced Manufacturing Firms

Business Function	Percentage
Electronic, electronic equipment & components	13%
Aircraft/aerospace	11%
Fabricate metals products	10%
Industrial/commercial machinery & computer equipment	8%
Signs & advertising specialties	6%
Biotechnology	5%
Printing, publishing and allied industries	4%
Information & communication technologies	3%
Measure/analyze/control instruments, photo/medical/ophthalmic goods	3%
Other industry specified	11%

5- Year Projected Employment Growth by Occupational Cluster 2014-2018
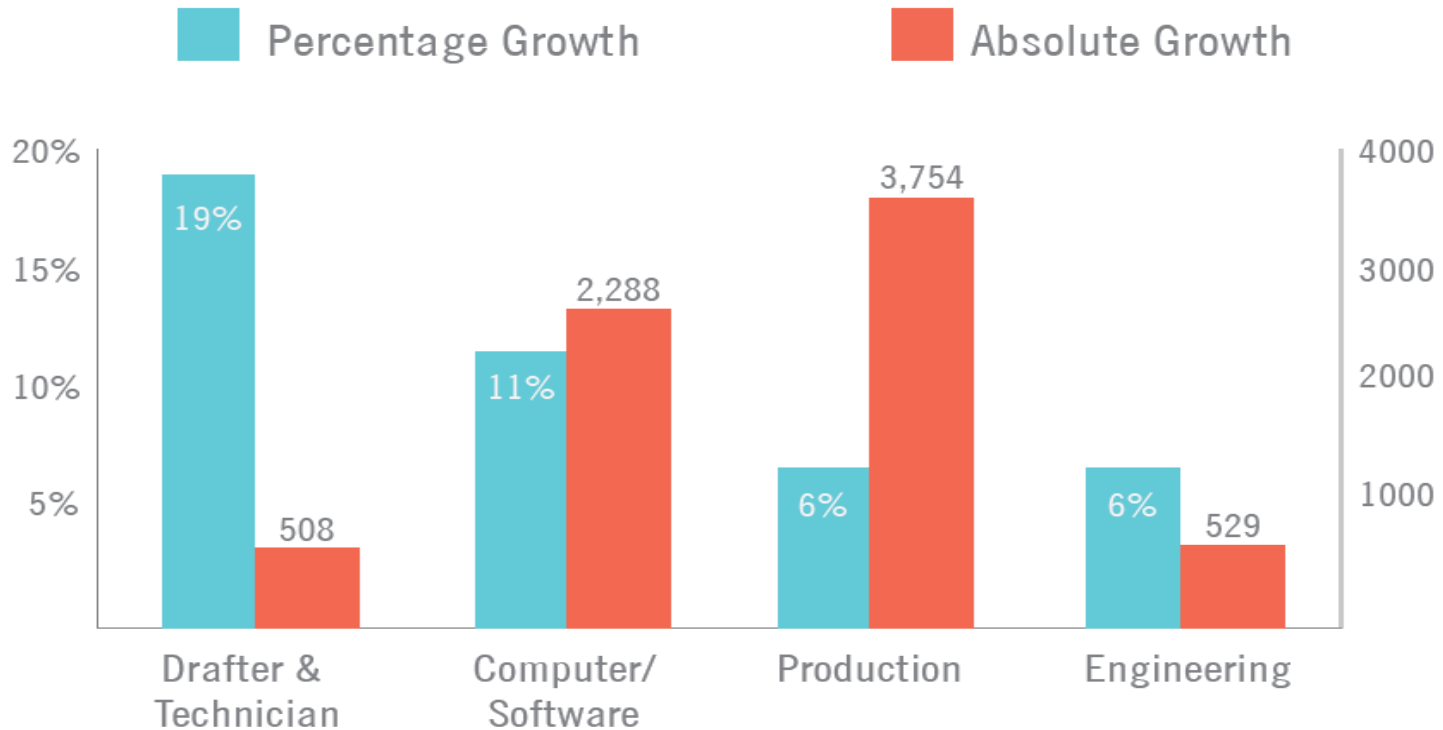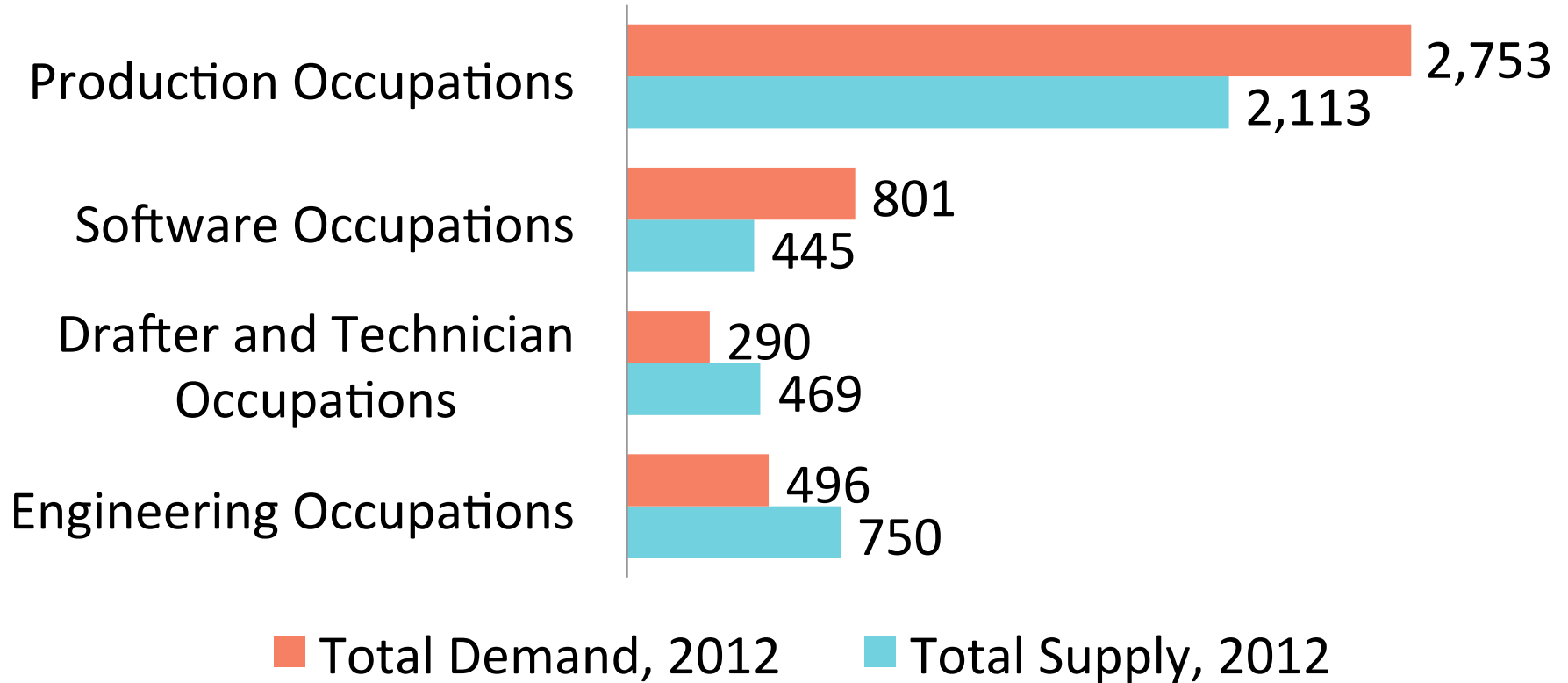
Education and Training Requirements

- Most Advanced Manufacturing occupations require **high school education** at a minimum. Moving up the career ladder **requires on-the-job experience** or **more academic credentials**, some are provided by 2-year or 4-year colleges.

- Many occupations require a **specific set of skills** for their workers, which can be acquired with a education credential.

- There are certain educational credentials that can be applied to multiple occupations.

Basic Workforce Competencies

- Basic mathematical aptitude
- Critical thinking
- Integrity
- Motivation
- Dependability
- Willingness to learn
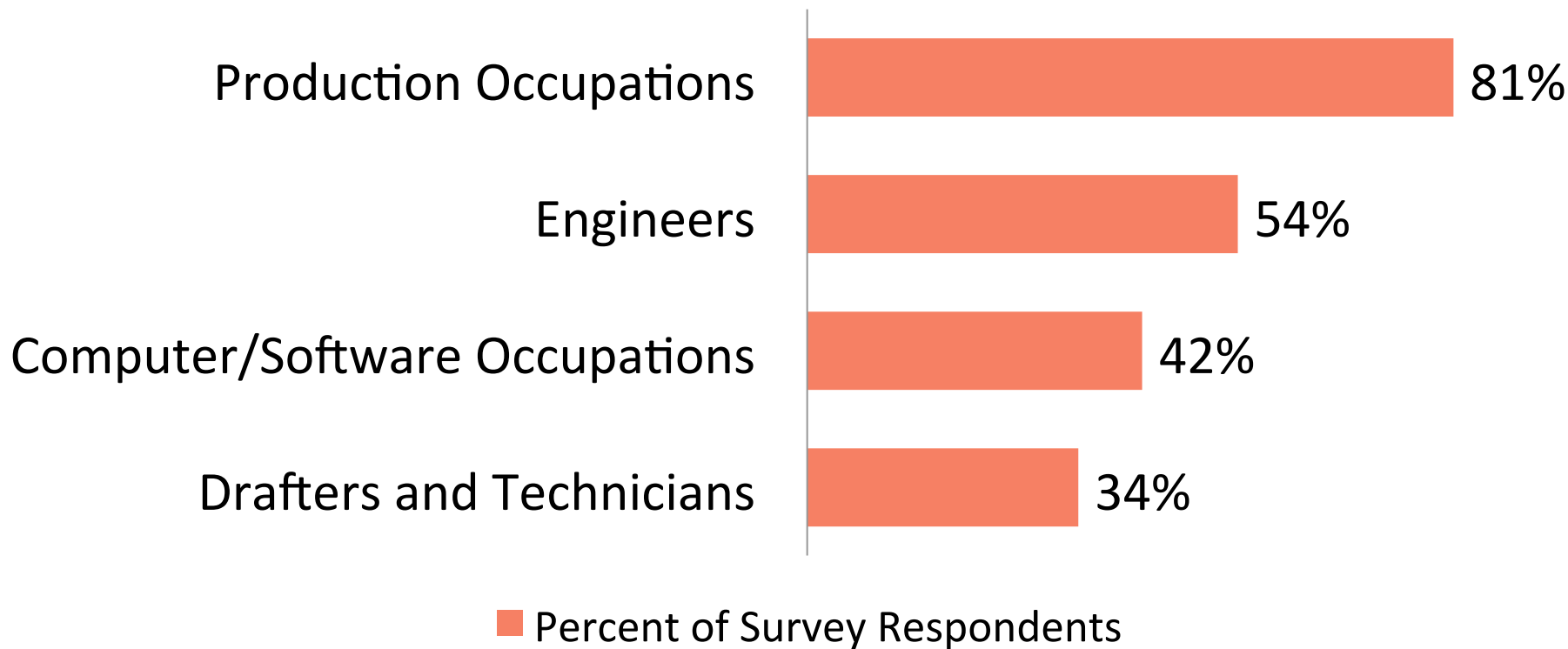
Production Occupations – Top 5 In-Demand Skills

Occupation	Skill Sets	
Machinists	1. Machining 2. Computer Numerical 3. Control (CNC) Mathematics	4. Lathes 5. Machine Tools
Inspectors, Testers, Sorters, Samplers, and Weighers	1. Inspection 2. Calipers 3. Mathematics	4. Micrometers 5. Calibration
Computer Controlled Machine Tool Operators	1. CNC 2. Machine Operation 3. Inspection	4. Machining 5. Lathes

"We don't just need people that know how to work with the machines; we need people that understand the machine's capabilities, metal characteristics, and tolerances. This knowledge only comes from experience working with machines."

Engineering Occupations – Top 5 In-Demand Skills

Occupation	Skill Sets	
Electrical Engineers	1. Electrical Engineering 2. Circuit Design	3. Simulation 4. Validation
Mechanical Engineers	1. Mechanical Engineering 2. Mechanical Design 3. Validation	4. CAD 5. Product Development
Computer Hardware Engineers	1. Electrical Engineering 2. VHSIC Hardware Description Language 3. Verilog	4. Simulation 5. Hardware Experience

"Engineers without machinery experience often design parts that aren't capable of being built, often due to machine or materials capabilities. Engineers that have machinery experience and education are in very high demand..."

Computer/Software Occupations – Top 5 In-Demand Skills

Occupation	Skill Sets	
Software Engineer/ Programmer Analyst / Developer Applications & Systems	1. Software Engineering 2. JAVA	3. LINUX 4. Systems Engineering 5. C++
Computer User Support Specialist/ Technical Support/ IT Specialists	1. LINUX 2. Computer Networking 3. Help Desk Support	4. Transmission Control Protocol/ Internet Protocol 5. Microsoft SharePoint
Computer Network Support Specialist/ LAN Specialist	1. Technical Support 2. Help Desk Support 3. Oracle	4. Repair 5. SQL

Drafter/Technician Occupations – Top 5 In-Demand Skills

Occupation	Skill Sets	
Mechanical Drafters	1. CAD 2. Mechanical Design 3. CAD Design	4. AutoCAD 5. Mechanical Engineering
Engineering Technicians, Except Drafters	1. Software Engineering 2. JAVA 3. LINUX	4. Systems Engineering 5. C++
Mechanical Engineering Technicians	1. Repair 2. Schematic Diagrams 3. Wiring Diagrams	4. Hand Tools 5. Soldering

Education & Training Matrix

Design & Engineering | Production | Maintenance | Logistics | Information Technology
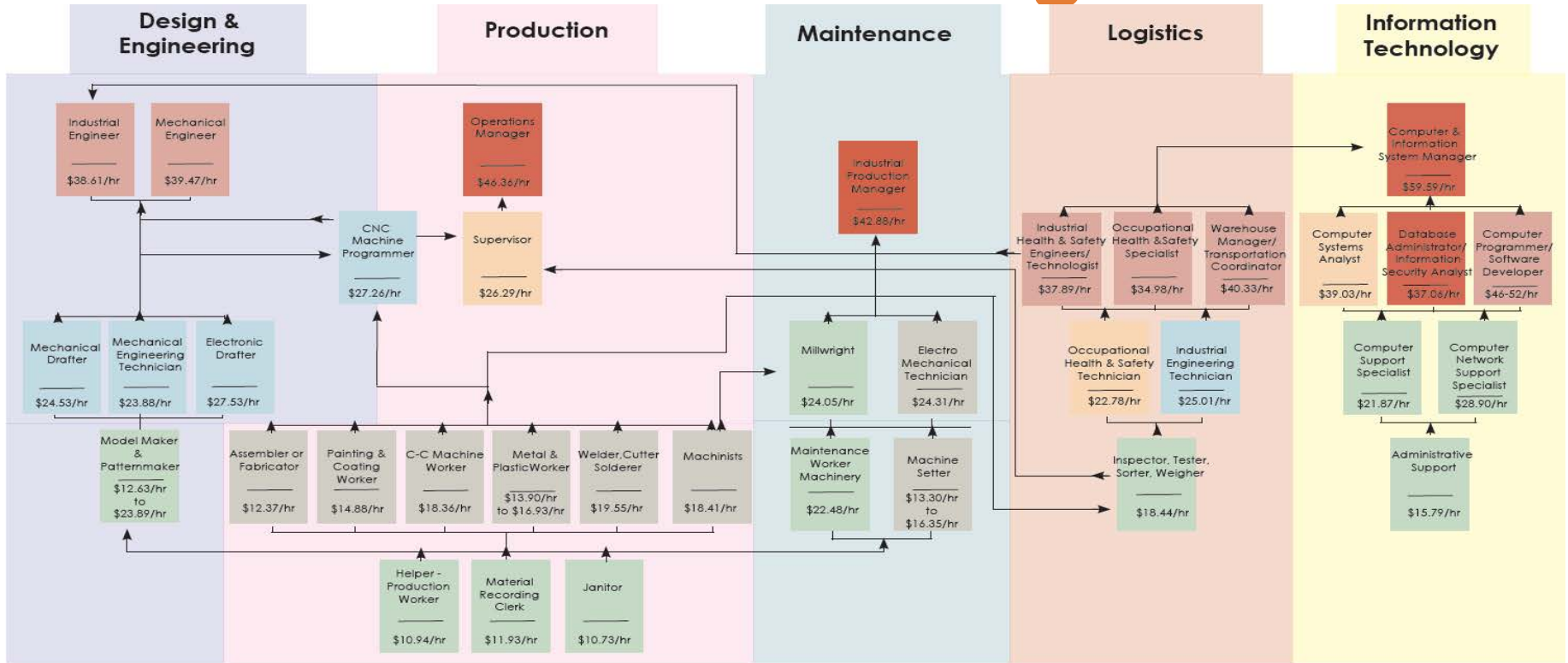
Wages are median hourly wages in 2013
Educational attainments are recommended (not required for all occupations)

Legend

Bachelors Degree + Work Experience | Bachelors Degree | Associates Degree + Work Experience | Associates Degree | High School Diploma + Work Experience | High School Diploma
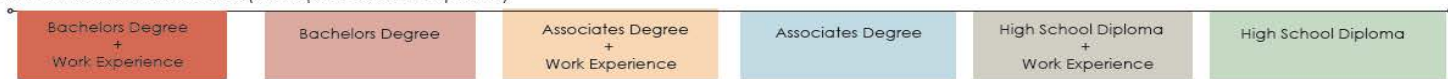
Recommendations

- Inform the public about the skills and levels of compensation in the Advanced Manufacturing sector.

- Develop an Advanced Manufacturing talent pipeline

- Increase employer knowledge about business assistance programs for workforce training

- Add an internship and/or work experience requirements to education and training programs

- Encourage critical thinking and real world application in education and training programs

- Standardize certifications and articulation agreements

Q&A

The Research Team

San Diego Workforce Conference: Future Employment in Our Priority Sectors

Join the conversation: #SDPrioritySectors

INFORMATION & COMMUNICATION TECHNOLOGIES

An Occupational Sector of Opportunity

San Diego Workforce Partnership, October 2014

Phil Jordan & Josh Williams, BW Research

ICT: An Occupational Approach

1. What is an ICT occupational study?
2. What have we learned from the research?
3. What does this mean for the education & workforce development community?

Part 1

What is an ICT Occupational Study?

What is ICT?

- Information & Communication(s) Technologies (ICT) is similar to Information Technology (IT) with an emphasis on communication technologies.

- ICT can play both a core and/or supporting role for businesses (revenue generation vs. cost of business).

What is an Occupational Sector?

- Unlike other sector studies, we are not looking at a specific industry but instead examining 11 occupations.

- This is not comparable to SANDAG's ICT traded cluster, which is looking at core ICT businesses.

Methodology & Data Sources

1. Secondary data analysis (EDD, BLS, EMSI, regional research by EARI)

2. Phone & web survey of employers (short survey, n=225 / long survey, n=102)

3. Executive interviews with employers and industry professionals.

The ICT Occupations

- Software developers/engineers (apps)
- Software developers/engineers (systems)
- Computer programmers
- Information security analysts
- Computer systems analysts
- Web developers

The ICT Occupations

- Graphic designer
- Database administrator
- Network & computer system administrator
- Computer support specialist (software)
- Computer support specialist (hardware)

Why these occupations?

1. **They have grown faster** (7% 2004 to 2013 compared to 1.5% for region) than the economy as a whole

2. **They are expected to continue growing faster** (2013 to 2018 over 10%) than other occupations

3. **They pay more** (Median earnings are 19% higher than the County average)

Part 2

What have we learned from the research?

ICT Occupations: Industry Profile
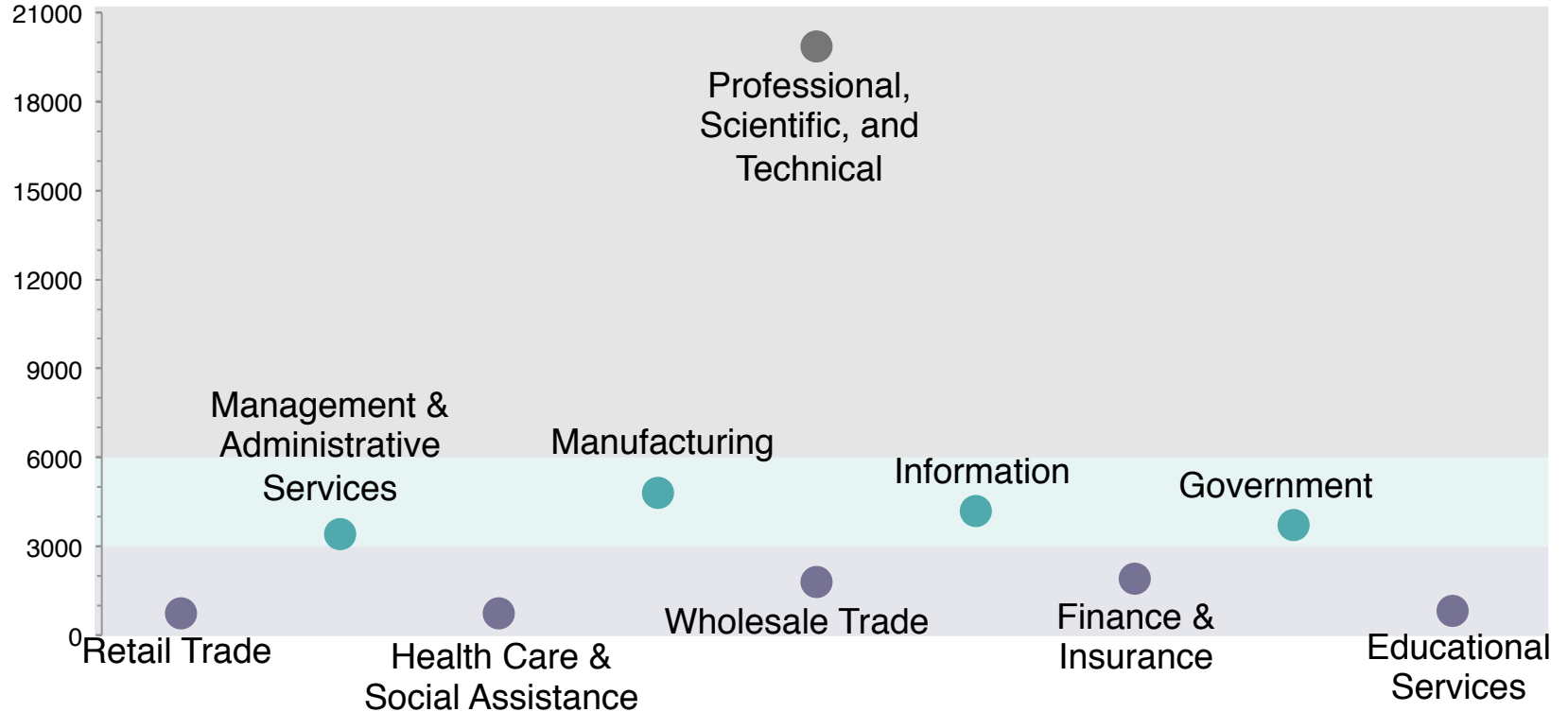
Core vs. Support (2007 to 2013)

- Support ICT occupations (computer support specialists) experienced a **decrease in employment of 5 percent** from 2007 to 2013.

- Core ICT occupations (software developer/engineer, applications or systems software) **increased employment by 7 percent** from 2007 to 2013.
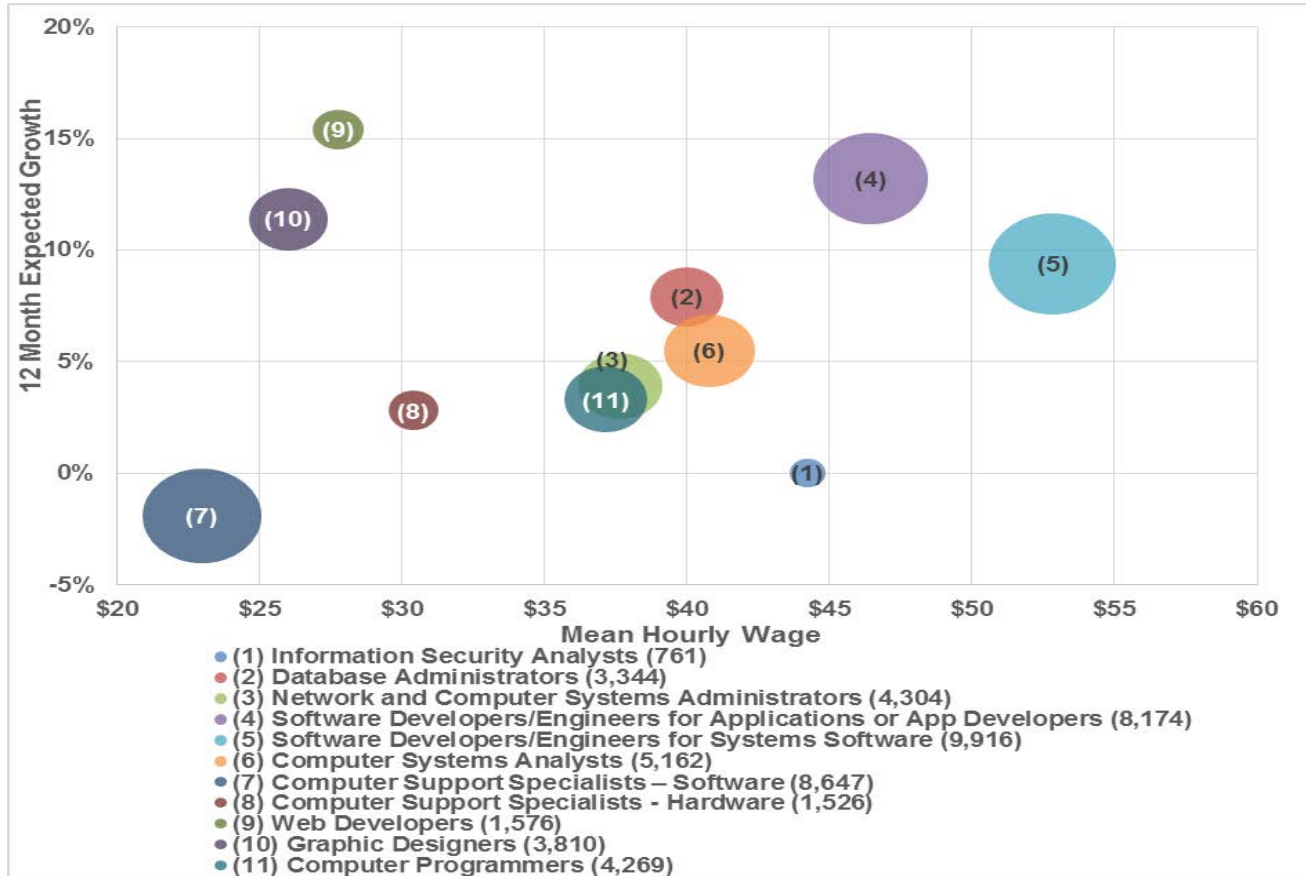
ICT Occupations in the County

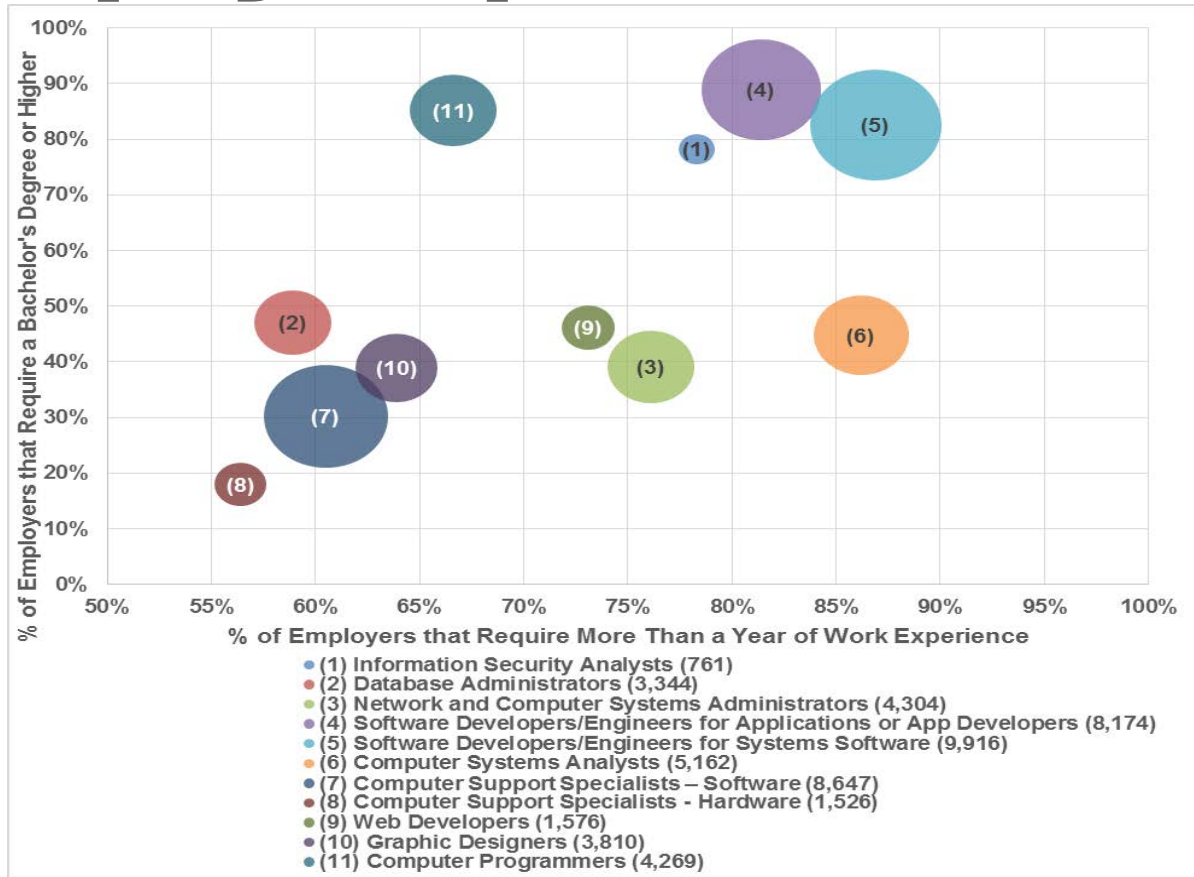The 11 ICT Jobs by City/Zip Code*
in San Diego County

2000 +
1000 - 1999
400 - 999
100 - 399
1 - 99
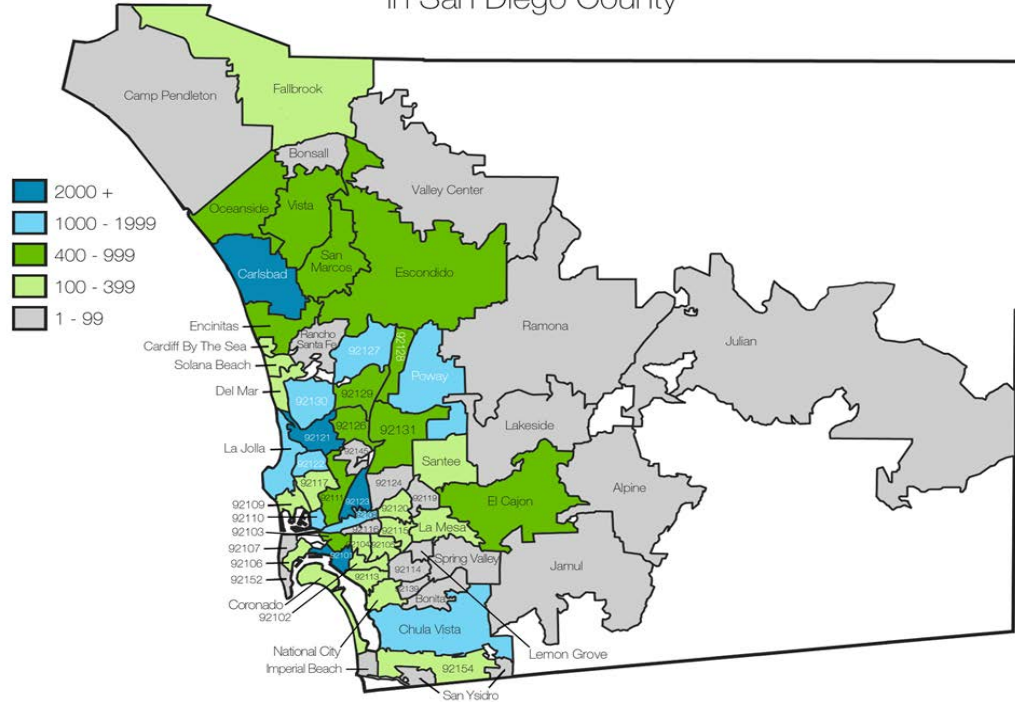
* Areas labeled by zip code are part of City of San Diego

ICT: Employer Expectations Growth

ICT: Employer Expectations Education

% of Employers that Require a Bachelor's Degree or Higher

% of Employers that Require More Than a Year of Work Experience

- (1) Information Security Analysts (761)
- (2) Database Administrators (3,344)
- (3) Network and Computer Systems Administrators (4,304)
- (4) Software Developers/Engineers for Applications or App Developers (8,174)
- (5) Software Developers/Engineers for Systems Software (9,916)
- (6) Computer Systems Analysts (5,162)
- (7) Computer Support Specialists – Software (8,647)
- (8) Computer Support Specialists - Hardware (1,526)
- (9) Web Developers (1,576)
- (10) Graphic Designers (3,810)
- (11) Computer Programmers (4,269)
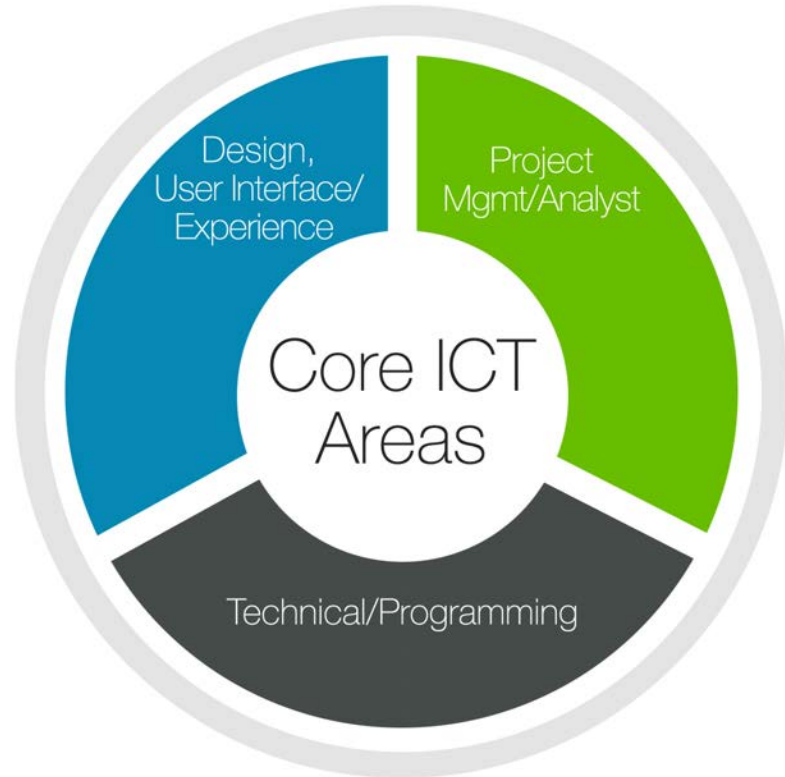
Industry Certifications or Certificates

- Over a third of employers expect industry certifications or certificates, for these occupations:
  - Information security analysts (44%)
  - Computer systems analysts (38%)
  - Database administrator (35%)
  - Computer support specialists, software (35%)
  - Network & computer systems administrators (35%)

ICT Occupational Segments

Gap Analysis (Demand vs. Supply)

- Programming / Technical Development: Undersupplied (-55)

- Project Mgmt. / Analysts: Undersupplied (-21)

- Technical Support: Available capacity

- Design, User Interface (Multimedia) : Available capacity

Skills Assessment

- **Relevant work experience** (highest difficulty for employers)
- **Technical training** specific to the position (higher difficulty for certain positions)
- **Workplace and social skills** (higher difficulty for certain positions)
- **Appropriate education** (lower comparable difficulty for employers)

Part 3

What does this mean for the education & workforce development community?

Expose & Educate

- Develop foundational ICT skills
- Educate students on ICT's four occupational segments
  - Design & interface
  - Project management & analysis
  - Technical development & engineering
  - Technical support

ICT Education & Training Strategies

- Foundational ICT skills and digital literacies

- Invest in educational programs & resources for ICT's technical development & engineering occupations

- Industry certifications & certificates should focus on technical support & analysis

ICT Education & Training Strategies

- Technical support positions need opportunities for industry experience & technical skills

- Core ICT positions need to emphasize strong academic & technical foundation

ICT Career Navigation (Support)

- **Self-directed learning**: Stay current on the technology

- **Communication & workplace skills**: Know how to communicate in a team & document technical information

- **Experience is key**: Work in different environments and industries

ICT Career Navigation (Core)

- **Self-directed learning**: Stay current on the technology

- **Entrepreneurial & adaptable:** Continue to grow with the technology and be willing to take on new challenges & responsibilities

- **Quantitative problem solver**: Have a rigorous foundation in relevant quantitative analytical tools.

Questions, Comments & Feedback

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