Digital Technology

Modernizing Industries and Connecting Communities

The modernized National Career Clusters Framework comprises 14 industry-oriented, sector-specific Career Clusters and 72 Sub-Clusters. Industry sector profiles serve as a resource for each Career Cluster. Each profile provides a Cluster overview, details the Sub-Clusters, and contains labor market data, occupational data, and relative skills.

Each industry sector profile was developed through an analysis of quantitative and economic data organized by the North American Industry Classification System (NAICS), Standard Occupation Classification (SOC) codes, as well as national labor market data from the U.S. Bureau of Labor Statistics (BLS) and other federal sources. The Career Cluster title and caption, full definition, and Sub-Clusters

with definitions are part of the official Framework and informed by input from sector-focused Industry Advisory Groups convened.

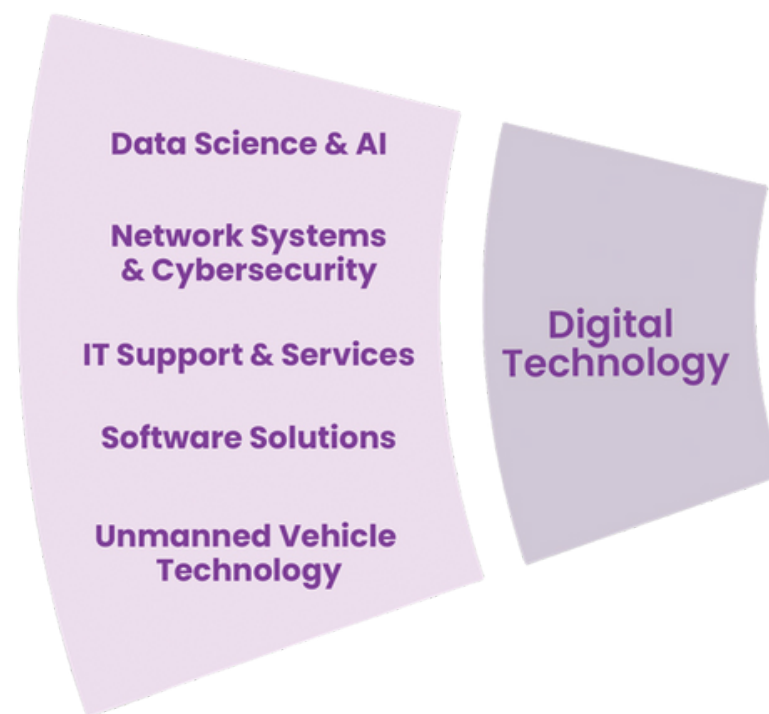The Industry Sector Profiles can be used in a variety of ways, including to:

- ❯ understand the breadth and depth of each Cluster;
- ❯ identify skills, competencies, and careers that can be incorporated into curriculum and program design;
- ❯ create connections and opportunities for work-based learning;
- ❯ assist learners in career exploration and advising;

...and many other possible uses!

Overview: Digital Technology Career Cluster

The Digital Technology Career Cluster, as a standalone Cluster, centers on a wide range of career opportunities focused on developing and maintaining digital infrastructure and systems that support and connect industry areas, including web and phone applications, physical hardware, and emerging technologies. Contextualized within the other Career Clusters, learners can understand how to leverage technology to ensure each industry sector is best positioned for success through effective use of digital tools. This Cluster falls within the "Connecting and Supporting Success" Cluster Grouping, recognizing learners' passions for illustrating how each industry requires specialized skills outside their sector area to succeed. For more information about the interdisciplinary nature of the Career Clusters, including the application of the Cross-Cutting Career Clusters read the Interdisciplinary Elements explainer resource. This profile is not exhaustive of the breadth and depth of opportunities in this Career Cluster.

The Digital Technology Career Cluster focuses on developing digital systems for communication and data storage using critical technologies such as artificial intelligence (AI), data analytics, and cybersecurity. This Cluster builds skills necessary for all careers to navigate and lead in the constantly evolving tech landscape and drives innovation across all industries to tackle complex challenges and opportunities in communities and economies. For more information on changes within this Cluster, see Appendix A.

Data Science & AI

Network Systems & Cybersecurity

IT Support & Services

Software Solutions

Unmanned Vehicle Technology

Digital Technology

Sub-Clusters, Definitions, & Example Programs of Study

Data Science & Artificial Intelligence

Careers combining the power of data analysis, machine learning, and artificial intelligence (AI), including key processes such as data modeling and natural language processing. Professionals in this field apply critical thinking to work on innovative solutions to interpret vast amounts of information, automate decision-making processes, develop intelligent algorithms that improve with experience, and enhance communication between humans and machines. AI requires attention to ethical standards and is poised to revolutionize all industries by enhancing efficiency, personalizing experiences, and driving innovation.

Example Programs of Study

Applied Data Science & Analytics

Information Technology (IT) Support & Services

Careers focused on providing setup, assistance, and problem-solving solutions for software, hardware, and other technology-related issues to ensure smooth and efficient operation of communication and data systems for individuals and organizations. This field is essential in maintaining, supporting, and optimizing technological infrastructure, ensuring minimal disruption and maximum efficiency.

Example Programs of Study

Information Support & Services

Network Systems & Cybersecurity

Careers focused on establishing and managing communication networks and protecting them against cyber threats. This Sub-Cluster includes network setup, administration, and maintenance and the implementation of security measures to prevent unauthorized access and data breaches.

Example Programs of Study

Computer Networking
Cybersecurity
IT Systems

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Software Solutions

Careers involved in the development and maintenance of software solutions, built on computer science and encompassing programming, application development, and front-end and back-end software development. This Sub-Cluster also includes developing emerging technologies such as augmented and virtual reality, the Internet of Things, distributed ledger technologies, and quantum computing. It involves creating the underlying code and systems that power applications, designing user interfaces for optimal user experience, and building server-side technologies that process data behind the scenes.

Example Programs of Study

App Design
Computer Simulation
Game Development
Programming

Unmanned Vehicle Technology

Careers related to the development, operation, and use of unmanned vehicles, such as unmanned aerial vehicles, drones, and autonomous ground vehicles, across various sectors. Applications include aerial surveying, precision farming, search and rescue, delivery services, resource management, hazardous environment remediation, and infrastructure inspection. Professionals in this field engage in design, programming, data analysis, and operational management.

Example Programs of Study

Drone Technology
Unmanned Aircraft Systems

Web & Cloud

Careers focused on creating and managing websites and web applications, including front-end and back-end development and maintenance, as well as overseeing cloud services and infrastructure. This field merges software skills with user interface/user experience and cloud management expertise, ensuring website functionality, security, and cloud efficiency.

Example Programs of Study

Cloud Computing
Web & Digital Communications
Web Development

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Occupations, Employment Contexts, Credentials, & Skills

Designing intentional and labor market-aligned pathways requires understanding the occupations and skills that are in demand and commanding family-sustaining wages in your context. Building a deeper understanding of employment trends, including wage potential, a clear picture of the types of employment contexts or businesses this sector offers, and the knowledge and skills needed for success are all important aspects of a learner's journey through their pathway and into the world of work. Leaders can use the data below to inform pathway design at the state or local levels or by advisors and learners as they plot paths to the future. The skills and occupations below were validated using real-time labor market information from 2023 and 2024 from online job postings, which provided the frequency with which skills were mentioned in digital job postings.

Top Occupations

The following table (Figure 1) displays the top occupations within this Cluster. Occupations are listed in order of typical entry-level education required for the position, beginning with a bachelor's degree and then moving through an associate degree, a Postsecondary nondegree award, and a High School Diploma to demonstrate the potential occupational pathways available in this Cluster. Data points for each occupation include five-year job projections, 2023 hires, average annual job openings, 10th percentile hourly earnings (as a proxy for entry-level wages), median hourly earnings, and required entry-level education. The table is reflective of national data and was pulled in 2024. Users should be mindful that the data in this table will not be updated, so the percentages and numbers are subject to change in real-time. For updated state-level occupation projection data, please visit O*NET's Projection Central.

FIGURE 1

Occupation Title	2024 Jobs	2029 Jobs	% Change	2023 Hires	Avg. Annual Openings	10th Percentile Hourly	Median Hourly	Typical Entry Level Education
Software Developers	1.791,385	2,082,344	16%	626,133	160,067	$36.50	$63.39	Bachelor's degree
Computer and Information Systems Managers	634,709	707,876	12%	228,835	57,416	$48.23	$81.24	Bachelor's degree
Computer Systems Analysts	538,012	583,713	8%	175,501	41,813	$30.02	$49.79	Bachelor's degree
Computer Occupations, All Other	508,934	553,342	9%	185,213	41,867	$22.99	$49.63	Bachelor's degree
Network and Computer Systems Administrators	345,469	363,622	5%	104,992	85,534	$28.00	$45.71	Bachelor's degree
Software Quality Assurance Analysts and Testers	212,754	241,965	14%	23,538	19,652	$28.19	$48.92	Bachelor's degree
Data Scientists	210,406	252,257	20%	96,477	21,865	$28.90	$51.68	Bachelor's degree
Information Security Analysts	196,234	230,337	17%	85,516	19,312	$33.13	$57.80	Bachelor's degree
Computer Network Architects	181,551	191,057	5%	54,482	12,011	$37.21	$62.30	Bachelor's degree
Computer Programmers	137,814	136,309	-1%	41,427	9,014	$27.14	$46.93	Bachelor's degree
Web and Digital Interface Designers	132,157	148,146	12%	54,984	12,984	$20.73	$44.66	BachelorS degree
Web Developers	102,048	113,887	12%	37,783	8,980	$19.84	$38.87	Bachelor's degree
Computer Hardware Engineers	89,755	95,812	7%	23,021	6,288	$38.82	$66.18	Bachelor's degree
Database Administrators	80,236	86,172	7%	26,899	5,976	$25.90	$48.66	Bachelor's degree
Database Architects	62,494	67,859	9%	21,300	4,833	$36.03	$64.57	Bachelor's degree
Computer Network Support Specialists	170,231	182,438	7%	62,506	14,239	$21.81	$34.39	Associate's degree
Computer User Support Specialists	748,935	799,809	7%	293,059	61,769	$17.96	$28.47	Some college, no degree

Top Industry-Recognized Credentials

- **Certified Information Systems Security Professional**

- **GIAC Certifications**

- **Project Management Professional Certification**

- **CompTIA A+**

- **Microsoft Professional and Technical Credentials**

- **Cisco Certified Network Associate**

- **IAT Level II Certification**

- **Certified Information Security Manager**

- **Certified Information System Auditor (CISA)**

- **CompTIA Security+**

These credentials are commonly requested by employers for the occupations listed on page 6, and were identified using national real-time labor market information from 2024.

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HIGH-DEMAND SKILLS

- Automation
- Business Requirements

- Presentation of data, data-based arguments, digital technologies
- Data Analysis
- Information Literacy

- Engineering (Radio Frequency)
- Mathematics, statistics, probability computational abstraction

- Agile Methodology
- Problem-solving
- Project Management
- Workflow Management

HIGH-DEMAND SOFTWARE SKILLS

AI Tools, Artificial intelligence Machine Learning
Error-checking / accuracy validation

C#, C++, HTML, Linux , Python Scripting, Java, Javascript

Angular (Web Framework), Cascading Style Sheets (CSS), Git (Version Control System), JIRA, Operating Systems, PowerBI, R / RStudio, RESTful API, Software Development, Software Engineering, Tableau

Amazon Web Services, Cloud, Cybersecurity, Digital forensics, Computer Science, Information Systems

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Sample Occupations & Emerging Occupations

These tables list sample occupations, emerging occupations, and sample places of work based on quantitative industry data validated by Industry Advisory Groups.

Sample Occupations

- Computer Network Architect
- Computer Network Support
- Computer Programmer
- Computer Systems Analysts
- Computer User Support
- Cybersecurity Specialist
- Data Scientist
- Database Administrator
- Database Architect
- GIS Specialist
- Information Security Analyst
- IT Support Specialist
- Network & Systems Admin
- Operations Research Analyst
- Quality Assurance
- Software Developer
- UI/UX Specialist
- Web & Digital Interface Designer
- Web Developer

Emerging Occupations

- 5G Network Engineer
- AI Ethics Officer
- Bioinformatics & Computational Biologist
- Chatbot Developer
- Cloud Solutions Architect
- Data Privacy Officer
- DevSecOps Engineer
- Drone Operator
- Edge Computing Specialist
- Mobile App Developer
- NFT Specialist
- Prompt Engineer
- Quantum Computing Researcher
- Sustainability Software Developer
- Voice Technology Developer
- VR/AR Developer

Sample Places of Work

- Almost all companies, especially large ones like airlines, manufacturing, food manufacturers
- Big Tech Firms
- Cloud Service Providers
- Cyber Security Firms
- E-Commerce Platforms
- Large Data Science Companies
- Self-Employed, Entrepreneur
- Small Businesses
- Social Media Companies
- Software Development Contractors
- Software development HR professionals
- Telecommunications Companies

Acknowledgements

About Advance CTE

Advance CTE is the longest-standing national non-profit that represents State Directors and state leaders responsible for secondary, postsecondary, and adult Career Technical Education (CTE) across all 50 states and U.S. territories. Established in 1920, Advance CTE supports state CTE leadership to advance high-quality CTE policies, programs, and pathways that ensure career and college success for each learner. Advance CTE is the steward of the National Career Clusters Framework.

ADVANCE >> CTE

State Leaders Connecting Learning to Work

Visit the **Career Clusters resources** to access the full Framework and to explore the complete methodology that informed its modernization.

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Appendix A: Cluster Changes

This appendix provides additional context about the change from the 2002 National Career Clusters Framework to the modernized National Career Clusters Framework released in 2024.

The National Career Clusters Framework, originally developed in 2002, provided the first consistent national organizing structure for CTE programs and was mostly aligned with education taxonomy and structure. The modernized Framework, centers industry taxonomy and structure to reflect the full world of work. More information about the modernization process can be found on the Advancing the Framework initiative page.

Digital Technology is one of three Cross-Cutting Clusters, which are defined as Clusters based on sector-specific and contextualized functions instead of purely discrete industry sectors. They serve as both a standalone Career Cluster and have specialized applications within each of the other Career Clusters, with the potential for programs of study to be contextualized within each Career Cluster. Cross-cutting jobs are found across all industries and are characterized by broad applicability and universal needs. In the original Framework, this sector served as a standalone Information Technology Cluster.

Terminology Adjustment: The modernized Framework expanded the Information Technology Cluster to the broader Digital Technology Cluster to reflect the modern technological focus of the world of work and the expansions that have been made to this sector since 2002.

Sub-Cluster Content: Industry experts in this field expounded upon the proliferation of drone-related roles across various sectors and the primary skills needed for operating a UV, which fell within the digital technology Cluster. Thus, the Unmanned Vehicle Systems were placed in the Digital Technology Cross-Cutting Cluster.

The separation of Software Engineering into the Cross-Cutting Digital Technology Cluster addresses the universal demand for software engineering skills across all industries, distinct from the more physically oriented engineering disciplines found in the Advanced Manufacturing Cluster . This move aligns with a broader industry trend towards embracing more inclusive terminology such as "programming" and "software development." These fields are recognized for offering diverse pathways into the profession, including non-traditional routes like coding bootcamps, reflecting the evolving landscape of career entry and progression in the digital age.