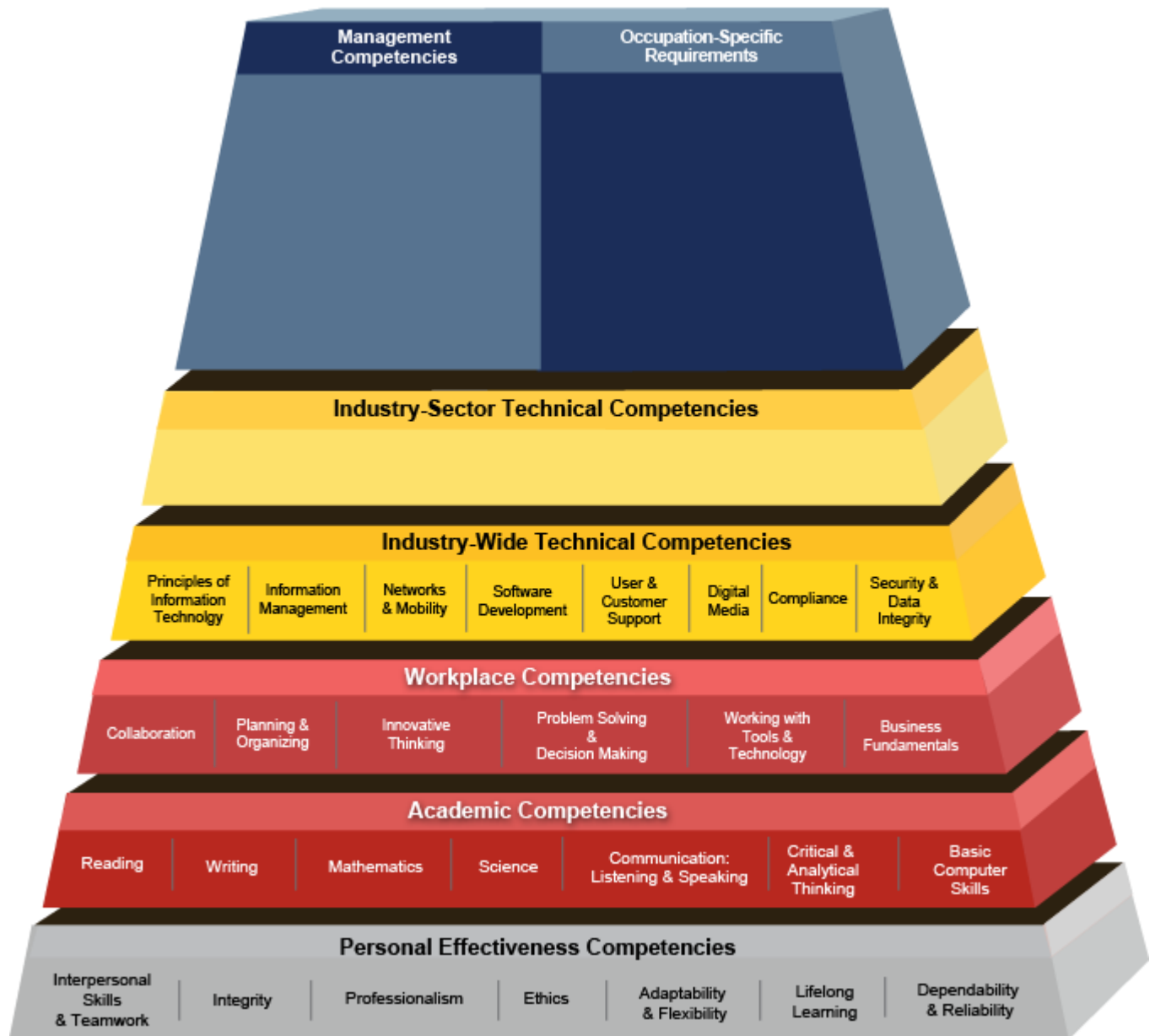


## Information Technology - Building Blocks for Competency Model





TOP-LEVEL SUMMARY OF COMPETENCY MODEL FRAMEWORK

**FOUNDATION COMPETENCIES TIERS (1-3)**

**Tier 1: Personal Effectiveness**

Interpersonal Skills & Teamwork
Integrity
Professionalism
Ethics
Adaptability & Flexibility
Dependability & Reliability
Lifelong Learning

**Tier 2: Academic Competencies**

Reading
Writing
Mathematics
Science
Communication: Listening & Speaking
Critical and Analytic Thinking
Basic Computer Skills

**Tier 3: Workplace Competencies**

Collaboration
Planning & Organizing
Innovative Thinking
Problem Solving & Decision Making
Working with Tools & Technology
Business Fundamentals

**Tier 4: Industry-Wide Technical Competencies**

Principles of Information Technology
Information Management
Networks & Mobility
Software Development
User & Customer Support
Digital Media
Compliance
Security & Data Integrity



**Tier 1—Personal Effectiveness Competencies**

<b>1. <u>Interpersonal Skills &amp; Teamwork</u>: Displaying skills to work with others from diverse backgrounds.</b>
<ul style="list-style-type: none"><li>▪ Respect the opinions, perspectives, customs, and individual differences of others</li><li>▪ Interact appropriately and respectfully with supervisors and coworkers</li><li>▪ Use appropriate strategies and solutions for dealing with conflicts and differences to maintain a smooth workflow</li></ul>
<b>2. <u>Integrity</u>: Displaying accepted social and work behaviors.</b>
<ul style="list-style-type: none"><li>▪ Treat others with honesty, fairness, and respect</li><li>▪ Comply with ethical standards for your field</li><li>▪ Take responsibility for accomplishing work goals within accepted timeframes</li><li>▪ Accept responsibility for one’s decisions and actions</li></ul>
<b>3. <u>Professionalism</u>: Maintaining a professional demeanor at work.</b>
<ul style="list-style-type: none"><li>▪ Demonstrate emotional intelligence</li><li>▪ Demonstrate self-control by maintaining composure and dealing calmly with stressful situations</li><li>▪ Accept criticism and attempt to learn from mistakes</li><li>▪ Demonstrate positive attitude towards work</li><li>▪ Dress appropriately for occupation and maintain appropriate personal hygiene</li><li>▪ Refrain from substance abuse</li></ul>
<b>4. <u>Ethics</u>: Demonstrating a willingness to work.</b>
<ul style="list-style-type: none"><li>▪ Pursue work with energy, drive, and effort to accomplish tasks</li><li>▪ Demonstrate discipline by persisting at a task despite interruptions, obstacles, or setbacks</li><li>▪ Take initiative in seeking out new responsibilities and work challenges</li><li>▪ Establish and maintain personally challenging, but realistic work goals</li><li>▪ Strive to exceed standards and expectations</li></ul>
<b>5. <u>Adaptability &amp; Flexibility</u>: Displaying the capability to adapt to new, different, or changing requirements.</b>
<ul style="list-style-type: none"><li>▪ Perform more than one task at a time while maintaining the ability to follow each task through to completion</li><li>▪ Deal with ambiguity by changing gears in response to unpredictable or unexpected events, pressures, situations, and job demands</li><li>▪ Effectively change plans, goals, actions, or priorities to deal with changing situations</li></ul>



**6. Dependability & Reliability: Displaying responsible behaviors at work.**

- Behave consistently, predictably, and reliably
- Fulfill obligations, complete assignments, and meet deadlines
- Follow written and verbal directions
- Comply with organizational rules, policies, and procedures

**7. Lifelong Learning: Displaying a willingness to learn and apply new knowledge and skills.**

- Demonstrate an interest and willingness to pursue personal and professional lifelong learning and development
- Treat unexpected circumstances as opportunities to learn and adopt new techniques
- Seek feedback and modify behavior for improvement
- Broaden knowledge and skills through science fairs, reading publications, job shadowing, and continuing education
- Use newly learned knowledge and skills to complete specific tasks
- Take charge of personal career development by identifying personal interests and career pathways



**Tier 2—Academic Competencies**

**1. Reading: Understanding written sentences and paragraphs in work-related documents.**

- Locate, understand, and interpret written technical and non-technical information in documents such as manuals, reports, memos, graphs, charts, tables, schedules, and signs
- Identify relevant details, facts, specifications, and main ideas
- Understand the essential message and purpose of written materials
- Infer or locate meaning of unknown or technical vocabulary

**2. Writing: Using standard English to compile information and prepare written reports.**

- Use correct English spelling, grammar, and punctuation to produce logical and accurate written correspondence, instructions, and documentation
- Communicate thoughts, ideas, information, and messages, which may contain technical material, in a logical, organized, and coherent manner
- Create documents such as letters, directions, manuals, reports, graphs, and flow charts
- Write words, numbers, sentences, reports, and data using technical terminology and notations
- Explain complex ideas to technical and nontechnical audiences

**3. Mathematics: Using mathematics to express ideas and solve problems.**

Know and apply mathematical principles:

- Number Systems and Relationships - whole numbers, decimals, fractions, binary, octal, and hexadecimal numbers
- Arithmetic – arithmetic operations on numbers, percentages, square root, exponentiation, and logarithmic functions
- Plane and Solid Geometry – distance, perimeter, area, and volume
- Measurement – measurement of length, mass, time, systems of measurement, units, and conversion between systems (e.g. from English to metric)
- Mathematical Notation - the language of mathematics to express mathematical ideas
- Mathematical Reasoning and Problem Solving – inductive and deductive reasoning, conjectures, arguments, strategies, and interpretation of results
- Elementary Statistics and Laws of Probability – mean, median, and standard deviation
- Elementary Algebra and Trigonometry – symbols, equations, and functions

**4. Science: Using scientific rules and methods to solve problems.**

# IT Sector Competency Model

## INDUSTRY-DRIVEN COMPETENCY MODEL FRAMEWORK

- Understand the scientific method (identify problems, collect information, form and validate hypotheses, draw conclusions) and apply basic scientific research
- Apply basic scientific principles to work-related problems
  - Physical
  - Chemical
  - Biological
  - Environmental
  - Technological

### **5. Communication—Listening & Speaking: Giving full attention to what others are saying and speaking in English well enough to be understood by others.**

#### **Listening**

- Receive, attend to, interpret, understand, and respond to verbal messages and other cues
- Apply active listening skills using reflection, restatement, questioning, and clarification
- Pick out important information in verbal messages
- Understand complex instructions

#### **Speaking/Presenting**

- Speak clearly and confidently using common English conventions including proper grammar, tone, and pace
- Express information to individuals or groups taking into account the audience and the nature of the information (e.g., explain technical concepts to non-technical audiences)
- Present ideas in a persuasive manner

### **6. Critical & Analytical Thinking: Using logic, reasoning, and analysis to address problems.**

- Use the principles of logic to make valid inferences and analyze problems
- Use inductive and deductive reasoning to analyze, synthesize, compare, and interpret information
- Draw conclusions from relevant or missing information
- Understand the underlying relationship among facts and connections between issues
- Organize problems into manageable parts

### **7. Basic Computer Skills: Using a computer and related applications to input and retrieve information.**



**Basic Computer Knowledge**

- Understand and efficiently use basic computer hardware (e.g. PCs, printers) and software (e.g. word processing software, spreadsheet software) to perform tasks
- Understand common computer terminology (e.g., program, operating system) and be familiar with the fundamental capabilities of computers
- Demonstrate technological fluency

**Desktop Applications**

- Use word processing programs to compose, organize, and edit simple documents and other business communications
- Use electronic mail to communicate and Internet applications to search for information
- Use spreadsheet, database, and presentation software
- Enter data and type materials quickly and accurately
- Double check work carefully and identify/correct typographical errors
- Manage file storage: use functions to store, retrieve, and sort detailed records



**Tier 3—Workplace Competencies**

**1. Collaboration: Working collaboratively with others for results.**

- Accept membership in and identify with the goals of a team
- Work effectively with multi-disciplinary teams
- Identify roles of team members and effectively communicate with all members of the team
- Collaborate with others to formulate team objectives and develop consensus for best outcome
- Use teamwork skills to achieve goals, solve problems, and manage conflict
- Give and receive feedback constructively
- Be open to considering new ways of doing things and the merits of new approaches to work
- Strive for cross functional effectiveness
- Leverage the strengths of others to accomplish a common goal
- Participate on virtual teams
- Respect cultural diversity

**2. Planning & Organizing: Planning and prioritizing work to manage time effectively and accomplish assigned tasks.**

**Planning & Organizing**

- Approach work in a methodical manner
- Apply effective organizational skills
- Keep track of details to ensure work is performed accurately and completely
- Find new ways of organizing or planning work to accomplish tasks more efficiently

**Project Management**

- Develop and implement a plan for a project
- Develop a timeline for sequencing the activities of a project
- Keep track of time and resources
- Anticipate obstacles
- Keep all parties informed of progress and all relevant changes to project timelines
- Engage in parallel-processing to keep multiple tasks moving forward

**Time Management**

- Establish specific goals to accomplish work in a timely manner
- Prioritize various competing tasks and perform them efficiently according to their urgency
- Ensure that others receive needed materials in time
- Stay on schedule

**3. Innovative Thinking: Generating innovative and creative solutions.**



- Employ unique analyses and generate new, innovative ideas in complex areas
- Reframe problems in a different light to find fresh approaches
- Entertain wide-ranging possibilities to develop unique approaches and useful solutions
- Understand the pieces of a system as a whole and possess a big picture view of the situation
- Integrate seemingly unrelated information to develop creative solutions
- Develop innovative methods of obtaining or using resources when insufficient resources are available
- Demonstrate innovative thinking by using new and existing technology in new ways

**4. Problem Solving & Decision Making: Applying critical-thinking skills to solve problems by generating, evaluating, and implementing solutions.**

**Identify the Problem**

- Anticipate or recognize the existence of a problem
- Identify the nature of the problem by analyzing its component parts and defining critical issues
- Locate, obtain, and review information relevant to the problem

**Generate Alternatives**

- Generate a variety of approaches to the problem
- Think creatively to develop new ideas for and answers to work related problems
- Use logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems
- Apply concepts of probability to help make decisions
- Exercise good judgment

**Choose and Implement a Solution**

- Decisively choose the best solution after contemplating available approaches to the problem
- Commit to a solution in a timely manner
- Use strategies, tools, resources, and equipment to implement the solution
- Observe and evaluate the outcomes of implementing the solution to assess the need for alternative approaches and to identify lessons learned

**5. Working with Tools & Technology: Selecting, using, and maintaining tools and technology to facilitate work activity.**



**Selection & Application**

- Identify, select, and apply tools or technological solutions appropriate to the task at hand (e.g., use statistical tools to show reliability of data)
- Identify potential hazards or risks related to the use of tools and equipment
- Operate tools and equipment in accordance with established operating procedures and safety standards
- Use information technology and computer applications as it supports the gathering, storage, manipulation, and transfer of data and information

**Keeping Current**

- Demonstrate an interest in learning about new and emerging tools and technologies
- Identify sources of information concerning state-of-the-art tools, equipment, materials, technologies and methodologies
- Seek out opportunities to improve knowledge of tools and technologies that may assist in streamlining work and improving productivity

**Maintenance**

- Perform routine maintenance on tools, technology, and equipment
- Determine causes of operating errors and decide what to do about it
- Troubleshoot maintenance problems in accordance with established procedures

**6. Business Fundamentals: Knowledge of basic business principles, trends, and economics.**



**Situational Awareness**

- Understand trends in the industry and the company's position in the market
- Recognize one's role in the functioning of the company and understand the potential impact one's own performance can have on the success of the organization
- Stay current on organizational strategies to maintain competitiveness

**Business Practices**

- Apply effective people and project management skills
- Use product improvement techniques
- Comply with the norms of conventional business etiquette

**Business Ethics**

- Act in the best interest of the company, the community, and the environment
- Comply with applicable laws and rules governing work and report loss, waste, or theft of company property to appropriate personnel
- Demonstrate professional ethics to protect the privacy of the client and preserve the integrity of the profession

**Global Awareness**

- IT supports globalization – intellectual work delivered at any time
- Effective response to business need
- Support innovation
- Global standards and standardization



**Tier 4—Industry-Wide Technical Competencies**

**1. Principles of Information Technology:** Knowledge of the Information Technology industry, its systems, platforms, tools, and technologies.

**Critical Work Functions:**

- Information Management
- IT Financial Management
- Networking
- Software Development
- Search
- Systems Development Life Cycle
- User and Customer Support
- Visual Communications
- Web Systems and Technologies



**Technical Content Areas:**

**Business Process Management**

- Business activity management
- Business process management green IT (efficient use of computing resources)
- Change management
- Content management
- Document management
- Imaging
- Process improvement (Lean/Six-Sigma)
- Process modeling
- System process integration

**IT Organizational Structure**

- The IT firm/organization
- IT support within a company
- Support for business solutions

**Platform Technologies**

- Architecture and organization
- Computing infrastructures
- Enterprise deployment software
- Firmware
- Global standards
- Hardware
- Open source
- Operating systems

**Systems Administration and Maintenance**

- Administrative activities
- Administrative domains
- Applications

**Systems Integration and Architecture**

- Acquisition and sourcing
- Architecture
- Integration and deployment
- Organizational context
- Requirements
- Testing and quality assurance

- Analytics
- Key performance indicators



**2. Information Management:** The use of technology to control and safeguard the collection, organization, structure, processing and delivery of information.

**Critical Work Functions:**

- **Analyze and Design Databases**
- **Business Intelligence**
- **Content Management**
- **Develop and Implement Databases**
- **Maintain Quality Assurance**
- **Perform Database Administration and Maintenance**
- **Perform Database Testing**
- **Performance Analytics**
- **Provide Data Assurance**



**Technical Content Areas:**

**Business Intelligence**

- Competitive intelligence
- Data analytics
- Data mining
- Predictive data modeling
- Web analytics

**Data Administration**

- Concepts and fundamentals of data management
- Content management – finding, sourcing, editing it
- Data integration
- Data modeling

**Database Management**

- Data architecture
- Data recovery
- Data search
- Data storage
- Database query languages
- Managing the database environment
- Metadata
- Semantic Web
- Special-purpose databases

**3. Networks & Mobility: The processes, hardware, and software employed to facilitate communication between computer systems and devices.**

**Critical Work Functions:**

- **Design Local Area, Wide Area, and Virtual Networks**
- **Install and Expand New Facilities**
- **Optimize and Maintain Network Software and Hardware**
- **Manage, Administer and Secure Local Area Networks**
- **Perform Network Infrastructure Troubleshooting**



**Technical Content Areas:**

- Application areas
- Foundations of networking
- LANS, WANS, virtual networks
- Mobile media
- Network management
- Physical layer
- Protocols (e.g. TCP, UDP, VoIP)
- Routing and switching
- Security
- Wireless

**4. Software Development:** The process of writing, testing, debugging/troubleshooting, and maintaining the source code of computer programs.

**Critical Work Functions:**

- **Analyze, Design, Develop, Adapt, Test and Maintain computer and Internet-based Applications**
- **Apply Principles of User-centered Design to Increase the Usability**
- **Establish and Maintain Consistency of a Product's Performance and its Functional and Physical Attributes with its Requirements, Design, and Operational Information Throughout its Life Cycle**
- **Implement, Support and Maintain Applications**
- **Test and Validate Applications**



**Technical Content Areas:**

**Application Architecture**

- Configuration and adaptation
- Deployment
- Global standards
- Patterns
- Risk management
- Scalability
- Standards
- Strategies

**Development/Programming Fundamentals**

- Data structures (list, vector, array, stack, queue, tree, graph)
- Algorithms (sorting, searching)
- Basic programming constructs (assignment, arithmetic expressions, loops, conditions, input/output, error handling)
- Event-driven programming
- Object oriented programming
- Programming concurrent processes
- User interface/user experience (UIUX)

**Development/Programming Technologies**

- Data mapping and exchange
- Familiarity with multiple programming languages
- Integrative coding
- Inter-systems communications
- Parallel systems development/programming
- Scripting techniques
- Software security practices

**Social Networking Services**

- Business/educational/personal networks
- Internal/external services
- Privacy/security
- Social capital

**Web Development**

- Quality assurance
- Technical content

- Web site design

Employment and Training Administration, programming and maintenance

United States Department of Labor

[www.doleta.gov](http://www.doleta.gov) • Web site/Internet security



**5. User & Customer Support:** The range of services providing assistance and technical support to help users implement and solve problems related to computer technology.

**Critical Work Functions:**

- **Assess User Needs**
- **Deploy Hardware/Software**
- **Monitor Metrics and Performance**
- **Provide Customer Service and Support**
- **Provide Training on New Hardware/Software**
- **Troubleshoot Problems**

**Technical Content Areas:**

**Engagement**

- Communicating with the user
- Community architecture
- Content development and categorization
- Engagement success metrics
- Gadgets
- Inventory and audit of content assets

**Helpdesk Functions**

- Administrative activities
- Application support
- Asset management
- Computing infrastructures and networks
- Configuration management
- Incident and problem management
- Operating systems
- Release management
- Systems administration, monitoring, and maintenance
- Strategies for engaging the community
- User participation guidelines/ground rules

**6. Digital Media:** Conveyance of ideas and information in forms such as presentation of audio, text, pictures, diagrams, photos, et cetera.

# IT Sector Competency Model

## INDUSTRY-DRIVEN COMPETENCY MODEL FRAMEWORK

### Critical Work Functions:

- Design, Edit and Develop Audio, Video, Graphic and Animations
- Use Specialized Software Applications to Create Digital Media for Kiosks, Computer Applications, Websites, Print Media, Broadcast Media And Entertainment
- Visualize Graphic Representation of Concepts or Data

### Technical Content Areas:

- Digital media application test and implementation
- Digital media design
- Digital media production and acquisition
- Gaming
- Graphics
- Multi-media technology
- Multi-user applications
- Streaming technologies
- Utilization and optimization
- Videos and dialogues
- Visual and functional design

**7. Compliance:** The standards, processes, and procedures in place to ensure that products comply with regulatory requirements.

### Critical Work Functions:

- Conduct Business Within the Standards of Corporate Ethics and Compliance
- Develop Measures to Ensure that Data and Information Systems Comply With Federal, State, Local Laws and Regulations, and Third Party Guidelines
- Develop Measures to Protect Confidential Data
- Follow Governance, Risk Management and Compliance Procedures



**Technical Content Areas:**

**Compliance Standards**

- Global standards
- Internet standards

**Important Topics**

- Intellectual property
- Professional ethics
- Safeguarding confidential data

**Public Policy**

- Client program management operations (PMO)
- Code of Federal Regulations (CFR)
- ISO requirements
- State and local laws

**8. Security & Data Integrity:** The standards, issues, and applications used to protect information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction.

**Critical Work Functions:**

- **Assure data and information systems are available to authorized uses**
- **Ensure data integrity**
- **Protect data and information systems from accidental disclosure or destruction**
- **Protect data and information systems from unauthorized access or modification**
- **Protect data and information systems vulnerable to inappropriate use or malicious compromise**



**Technical Content Areas:**

**Data Accessibility**

- Fundamentals of data security
- Operational issues
- Policy development
- User and customer support

**Data Integrity**

- Business continuity
- Disaster recovery
- Encryption
- ID management
- Information states
- Redundancy

**Security Clearance**

- US Citizenship (if required)

**Threats**

- Attacks
- Forensics
- Security domains
- Security mechanisms
- Security services
- Security tools
- Threat analysis model
- Vulnerabilities