



Cyber Intelligence Workforce

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Agenda

Project Background

- Research Methodology
- Findings

Training and Education

- Project Findings
- Workshop Results
- Objectives
- Traits
- Core Competencies and Skills
- Gap Analysis
- Potential Courses of Action



Cyber Intelligence Tradecraft Project Background

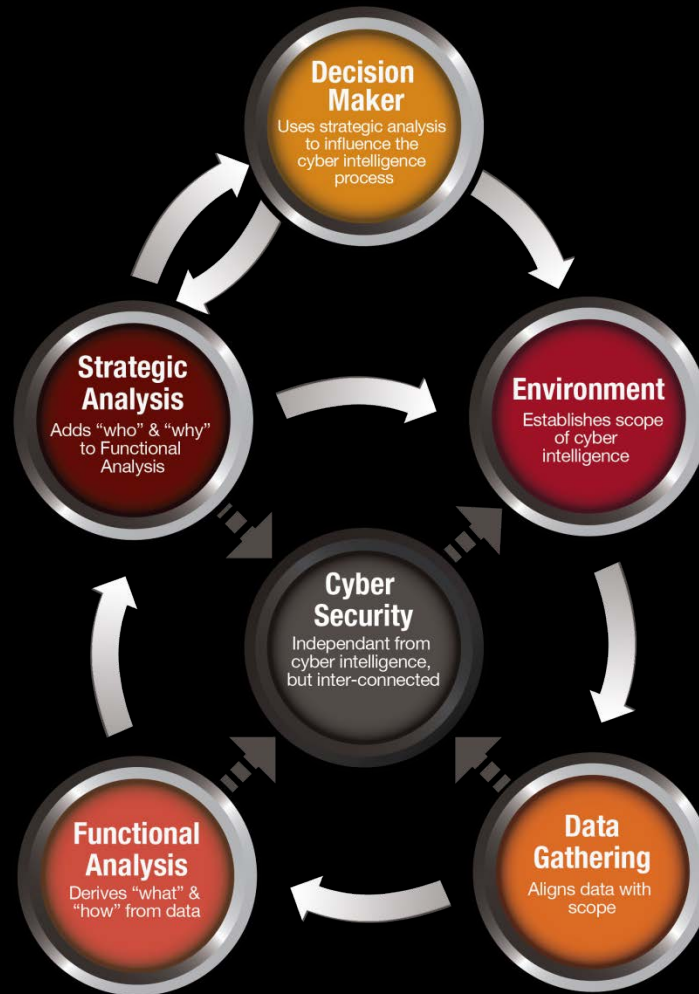
Charged with studying the state of cyber intelligence across government, industry, and academia

“Cyber intelligence is the acquisition and analysis of information to identify, track, and predict cyber capabilities, intentions, and activities of offer courses of action that enhance decision making.”

Goal is to advance the capabilities of organizations performing cyber intelligence by elaborating of best practices and prototyping solutions to shared challenges



Research Methodology: Cyber Intelligence Framework



Research Methodology: Participants and Baseline Sessions

Project Participants

- 6 government agencies
- 25+ organizations from academia and industry representing financial, legal, healthcare, retail sectors

Baseline Sessions

- Methodologies
- Technologies
- Processes
- Training



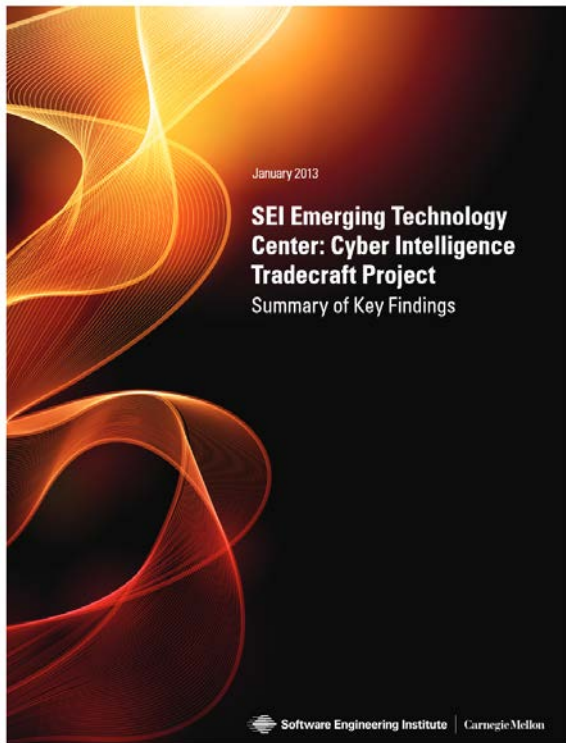
Findings: Disclaimer

What this is:

- Snapshot of organizations' cyber intelligence process
- Synthesized based on expert judgment
 - Not a Survey Monkey endeavor, lots of prodding, poking, and reading between the lines

What this is *not*:

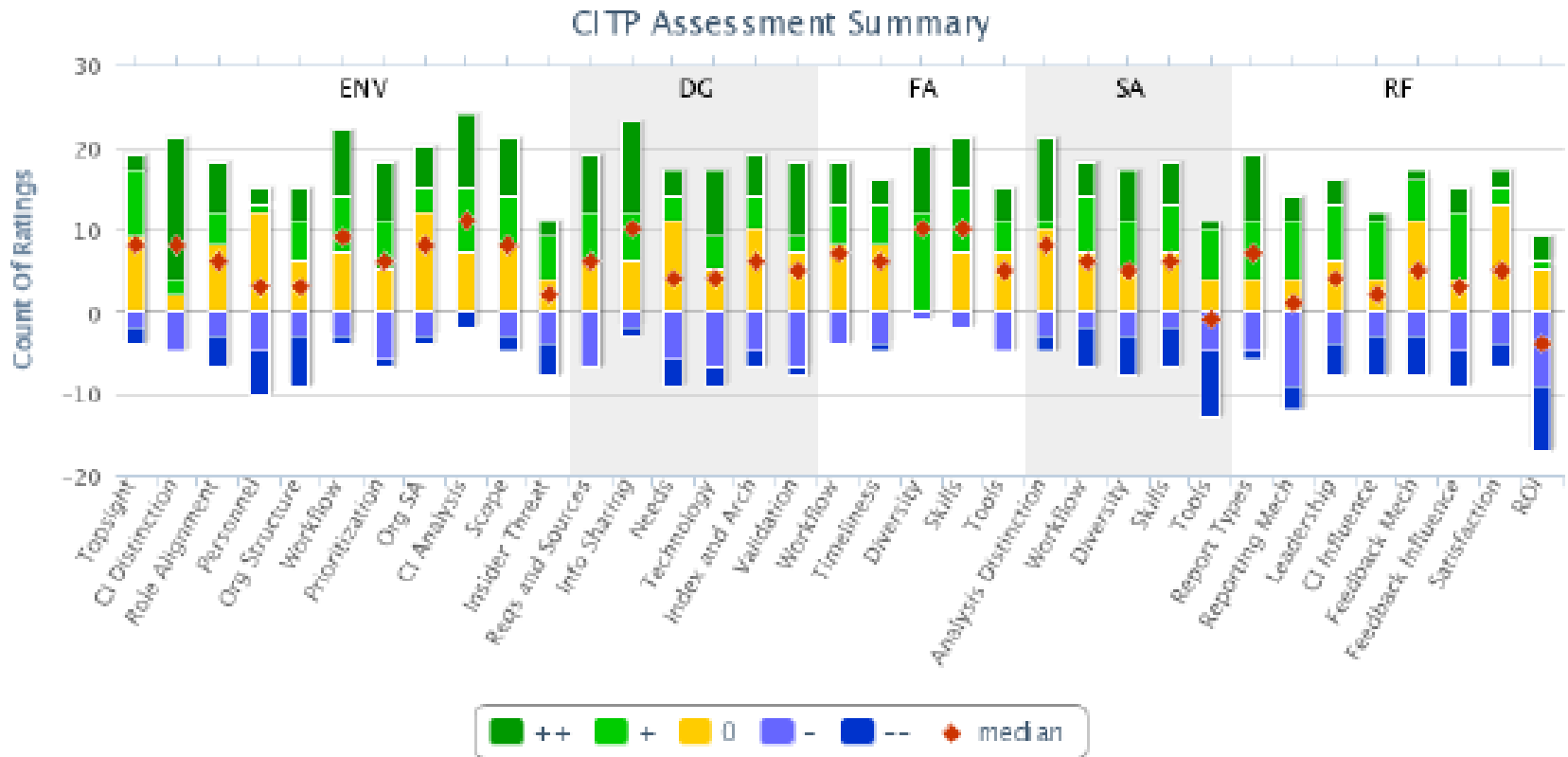
- A scorecard - Not all organizations need to be a best practice to get the job done
- Textbook ready - Relied on kindness of strangers, not independently verified data
- All encompassing - Participation bias



www.sei.cmu.edu/goto/cyberintel



Findings



What Cyber Intelligence Analysts Do...

Attribution Configuration guides Human intelligence Reverse engineering Linguistics Motive
Advanced Persistent Threats Supply chain Competitor analysis Zero days Industry trends Botnets
DNS Business intelligence Counterfeit products Academic research Mobile devices Social networking
Email phishing Malware Routing Geospatial intelligence Organizational policy implications Financials
Proxies Geopolitical issues Global economics IP logs Exploit kits Federal regulations Legal issues
Insider threats Physical security DDoS Systems administration Signals intelligence Software engineering
Incident response Risk management Supply chain Network administration Computer forensics
Network security Code Cryptography Vulnerability analysis Buffer overflows Cyber security blogs
Full packet captures Printer traffic Google referral data Log-ins IRC traffic Large file transfers
Academic journals Tactics, techniques, and procedures Law enforcement information Classified information
Patches Threat categorization Fraud Data gathering tools Natural disasters Intellectual property
Analytical tools Brand intelligence Acquisition Emergency response
Human factors



Backgrounds of Current Analysts...

DNI Tradecraft

undergraduate degree in Latin

Former help desk technician

Training

Former military signal corps

undergraduate degree in Philosophy

Network + Certification

Analysis Training

undergraduate degree in Computer Science

Former network security analyst

Former software engineer

A+ Certification

Classes offered at BlackHat

SANS Training

Master's in Strategic Analysis

Forensics Certification

Former think tank employee

undergraduate degree in Sociology

Former government intelligence analyst

Defense Intelligence Agency Network Training

undergraduate degree in International Relations

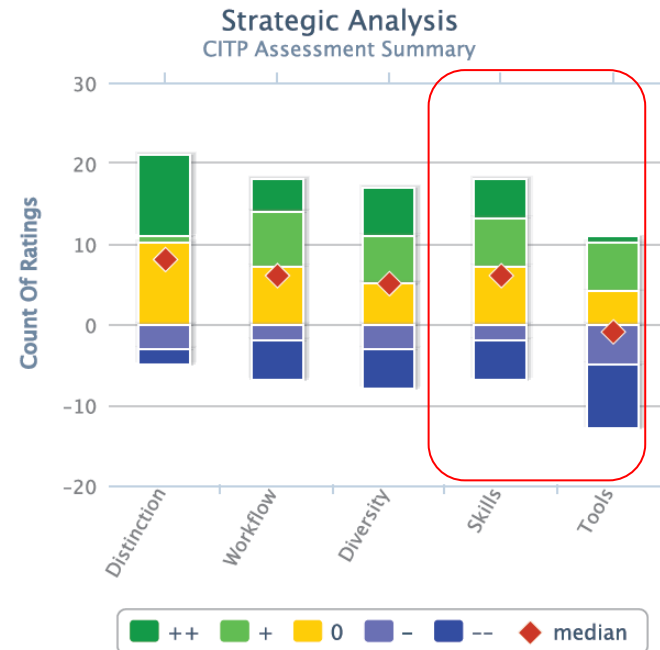
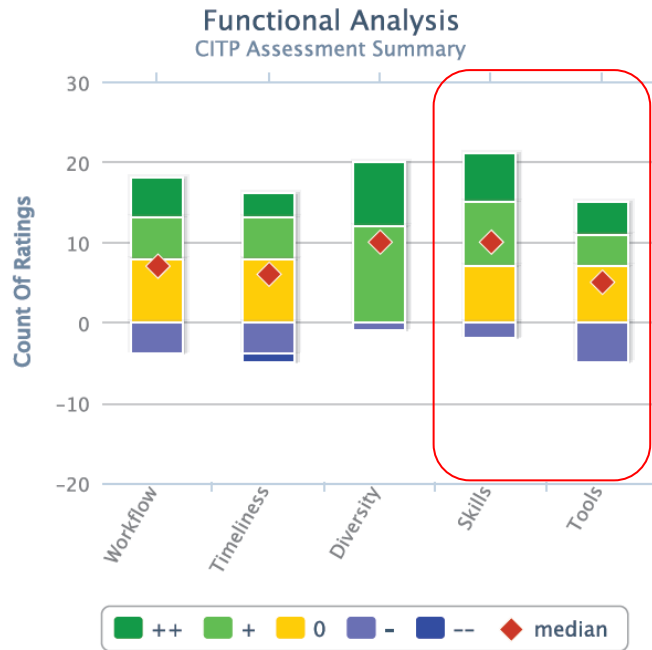
Tripwire Analytic Capability Training

Former military intelligence

CEH Certification



Project Findings: Challenges



- Resulting inefficiencies from the diverse job functions and skill sets
- Cultural differences
- Unrealistic job descriptions
- Education in silos



Training and Education Objectives

- Determine current state of training and education offerings for cyber intelligence analysts across academia, industry, and government
- Define the competencies and skills organizations should look for when hiring the “ideal” cyber intelligence analyst
- Identify the gaps between the current and desired state of cyber intelligence offerings
- Identify potential courses of action



Constraints

- Reviewed ~150 courses, trainings, and certifications from government, industry, and academia
- Very few “cyber intelligence” programs; searches were expanded to include cyber security and intelligence studies
- Searches were restricted to information found mainly online, though discussions with industry and academic contacts were insightful
- Limited number of government offerings, no classified courses



CITP Workshop



SEI Innovation Center

Cyber Intelligence Tradecraft Project Workshop

January 23–24, 2013

Please Join Us...

Carnegie Mellon University and the Software Engineering Institute's Innovation Center invite you to attend the Cyber Intelligence Tradecraft Project Workshop.

At the workshop, you will receive your baseline and benchmark results and the state of the practice report. You also will be able to engage with the SEI Innovation Center team, other participants, and CMU faculty on the project's future prototyping efforts and CMU's cutting-edge research in related fields.

Location: Pittsburgh, Pennsylvania

Day 1: Fairmont Hotel, 510 Market St. Pgh, PA 15222 ([Map and Directions](#))

Day 2: Carnegie Mellon University, 5000 Forbes Ave. Pgh, PA 15213 ([Map](#))



CITP Workshop - 2

Training & Education Track

- Participants finished statements such as:
 - A good analyst can...
 - I need someone that can...
- Answers populated a wish list of desired skills and capabilities
- Participants utilized human-centered design concepts to identify improvements to current training and hiring practices



Traits vs Competencies

Cyber Intel Analyst TRAITS

“Describe a cyber intelligence analyst”

“Wants to know why something is happening”

“Likes puzzles”

“Learns on the fly”

Cyber Intel Analyst CORE COMPETENCIES & SKILLS

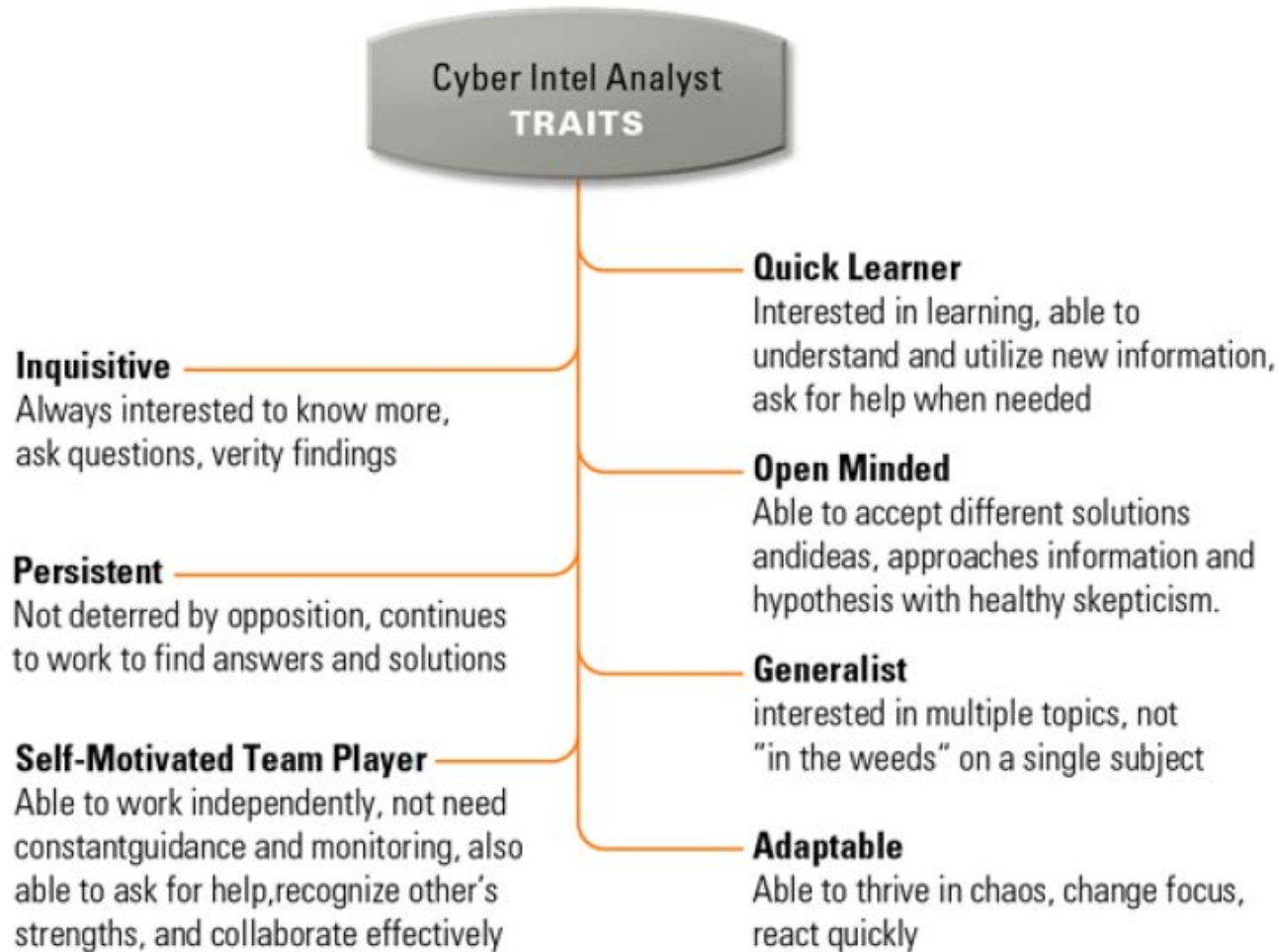
“Can communicate with leadership”

“Follows Intel Community tradecraft standards”

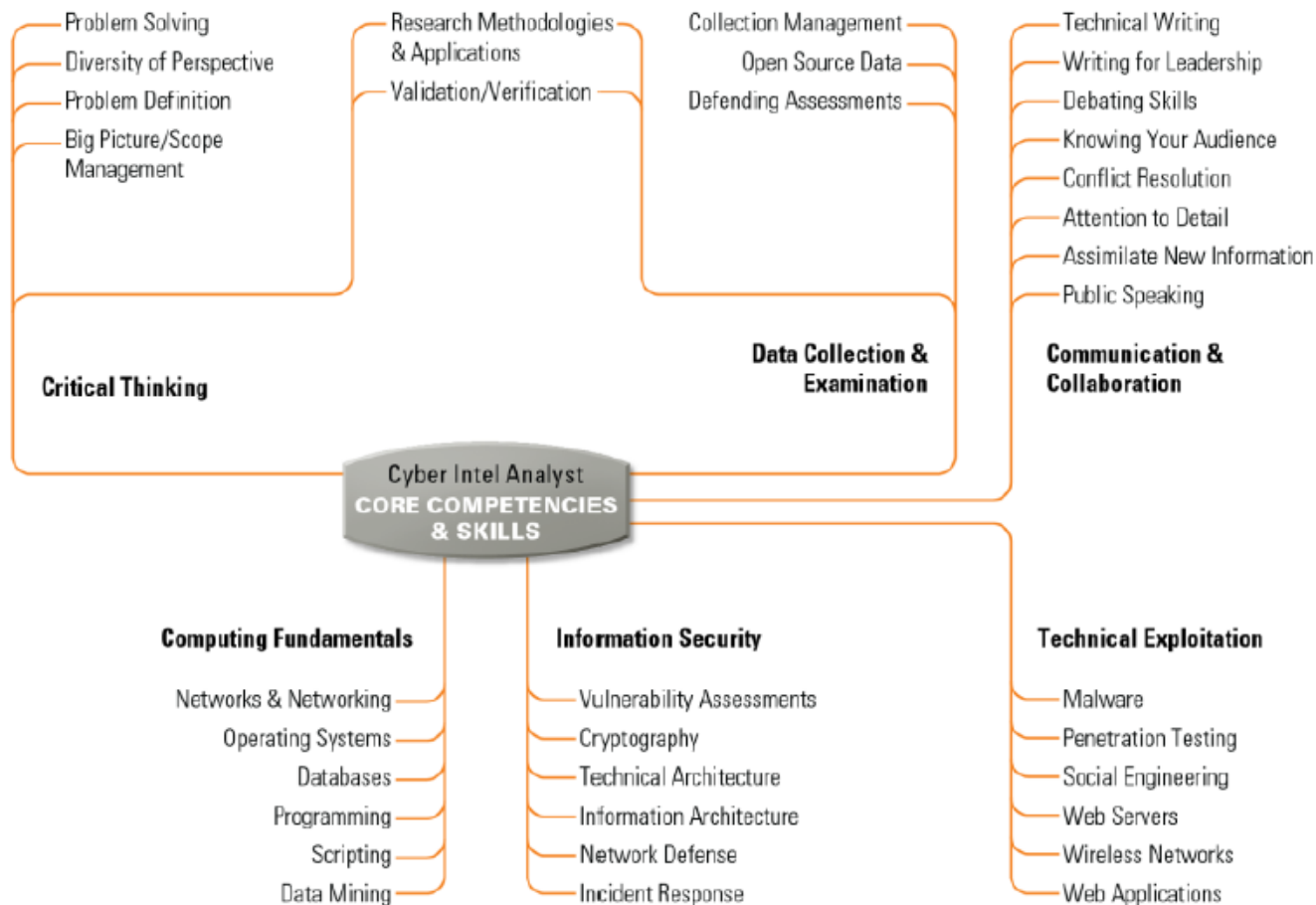
“Understands the domain”



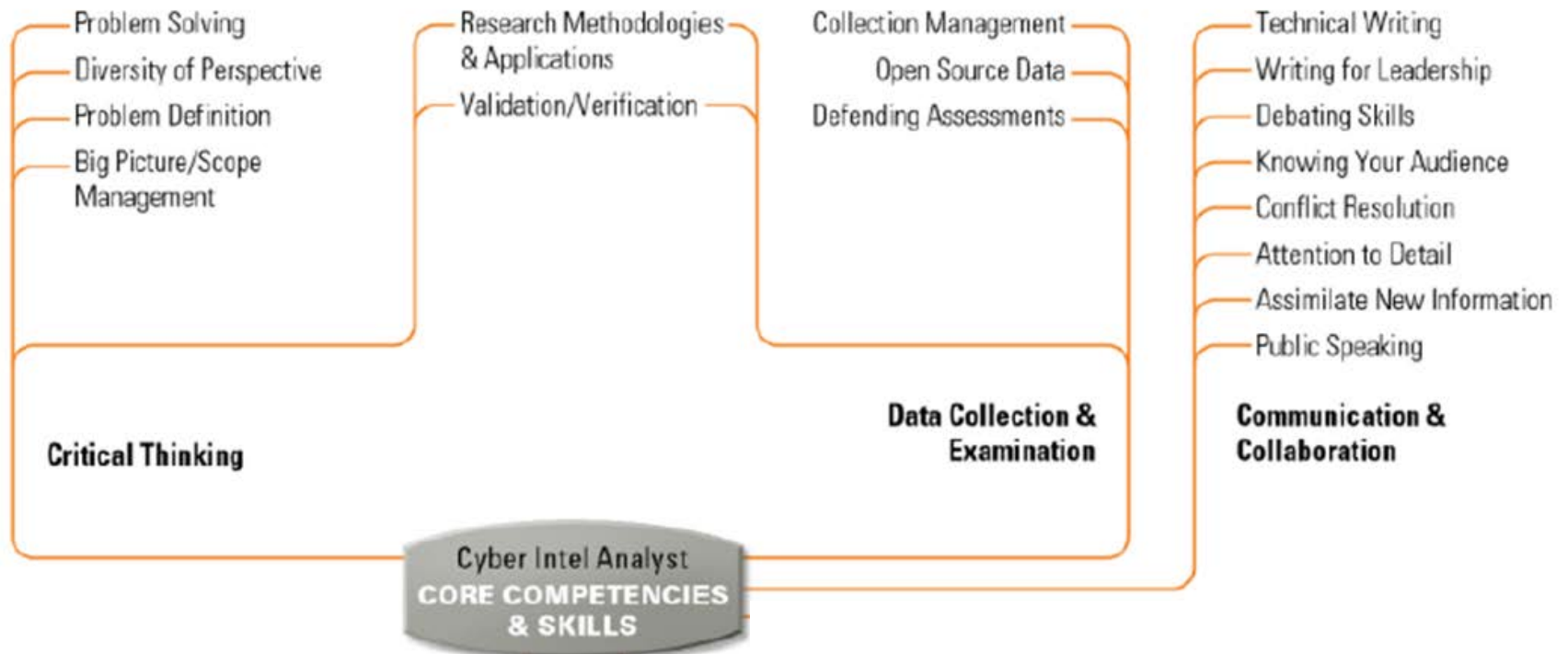
Traits



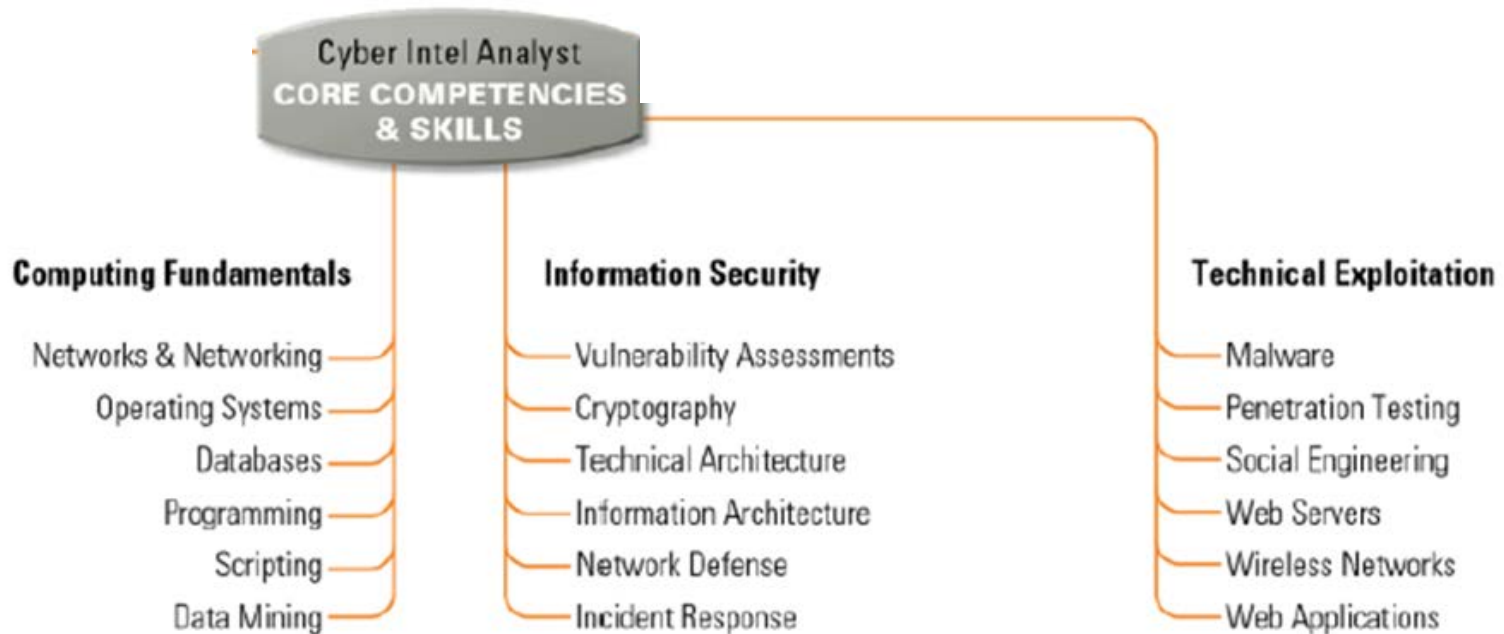
Core Competencies and Skills



Core Competencies: Analytic Competencies



Core Competencies: Technical Competencies



Gap Analysis

Competency	Skill	Courses		
		Good	Maybe	
Critical Thinking	Problem Definition Problem Solving	NONE	NONE	
			AMU - Intelligence Operations AMU - Analytics II AMU Threat Analysis MU - Analytic Techniques MU - Cyber Threat Analysis ASU - Advanced Intelligence analysis: Operating in Complex Environments	
	Diversity of Perspective	NONE	NONE	
	Big Picture/Summarization/Synthesis		ASU - Grand Strategy, Intelligence Analysis, and Rationality	
	Scope Management	HPU - Intelligence Team Management	UM - Intelligence Management and Oversight	
	Research Methodologies & Applications		UM - Intelligence Analysis: Consumers, Uses, and Issues	DC3 - Cyber Analyst Course
			UDM - Research Methods	UM - Library Research Skills
			NPS - Cyber Systems and Operations Research Methods	
			HPU - Open Source Intelligence	
			MU - Research Methods in Intelligence	
AMU - Research Methods				
Skepticism/Validation/Verification		ASU - Introduction to Research Methods		
		HPU - Vetting		
Data Collection & Examination	Research Methodologies & Applications	UM - Intelligence Analysis: Consumers, Uses, and Issues	DC3 - Cyber Analyst Course	
		UDM - Research Methods	UM - Library Research Skills	
		NPS - Cyber Systems and Operations Research Methods		
		HPU - Open Source Intelligence		
		MU - Research Methods in Intelligence		
		AMU - Research Methods		
	Skepticism/Validation/Verification	Collection Management	HPU - Vetting	
			ISA - Intelligence Collection	ASU - Intelligence Analysis and National Security Perspectives
	Open Source Data		ISA - Cyber Collections	HPU - Intelligence Operations
			HPU - Intelligence Collection	HPU - Intelligence Practicum
			HPU - Recruitment Cycle	
			HPU - All Source Intelligence	
			NPS - Cyber Systems and Operations Research Methods	
			UM - Intelligence Collection: Sources and Challenges	
			SN - Cyber Intelligence Training	
Defending Assessments		AMU - Collection		
		HPU - Open Source Intelligence	ISA - Cyber Collections	
Communication & Collaboration	Defending Assessments	AMU - SIGINT	UM - Intelligence Collection: Sources and Challenges	
	Technical Writing	ERAU - Technical Report Writing	HPU - Writing for Publication	
	Writing for Leadership	CMU - Professional Writing	HPU - Writing for Publication	
	Debating Skills	Knowing your Audience	ISA - Analyst Training: Writing, Analysis, and Preparing Briefings	
			NONE	NONE
		NONE	NONE	

CITP Training and Education 21

Current offerings address little more than 50% of the identified competencies & skills

Discrepancies between needed skills and current training opportunities

Inconsistent/nonexistent training paths for cyber intelligence analysts

No academic programs that offers the ideal mix of technical and non-technical classes

Difficult for academic institutions to provide training using relevant tools and technology, especially using current data and threats



Potential Courses of Action

Assess current analysts and identify appropriate training to address deficiencies

- Use competencies mind map to review current skillset
- Target specific skills to improve, seek training to address the gaps

Hire differently

- Review and rewrite job descriptions tailored to needed competencies and skills
- Used list of traits to ask interview questions and determine if candidate has natural ability



Potential Courses of Action - 2

Explore internships and apprenticeships

- Partner with academic institutions to gain short term talent and provide feedback to schools

Rethink the traditional classroom

- Explore advanced tradecraft technology leveraging cyber intelligence, computer science, and visual analytics
- Put students in real world scenarios to enable successful learning
 - Conduct multi-source analysis
 - Emphasize the information that is critical to make recommendations and decisions
 - Demonstrate the impact of strategic decisions



For more information

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Backup Material



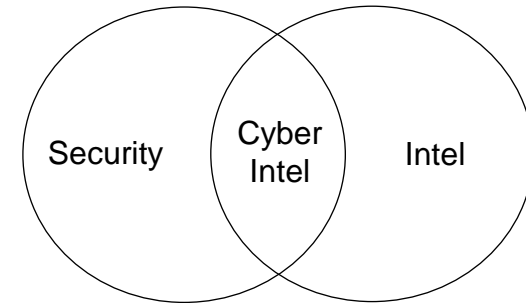
Distinguishing between functions

Cyber security

- Find the threat, fix the vulnerability, move on

Cyber intelligence

- Acquire and analyze information to identify, track, and predict cyber capabilities, intentions, and activities to offer courses of action that enhance decision making

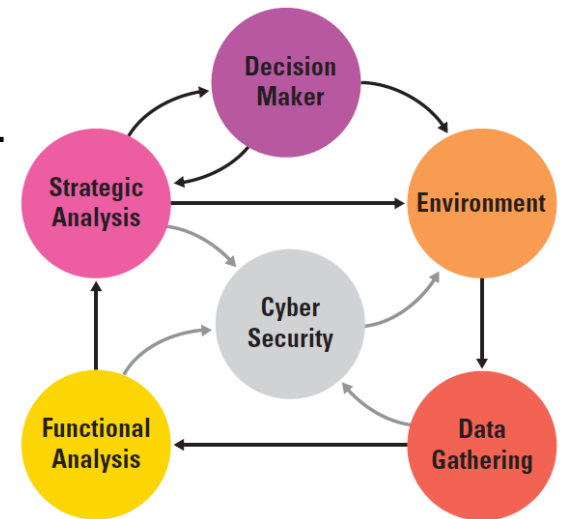


Functional analysis

- Answers “what” and “how:” Analyst identifies a compromised machine from proxy server logs and U.S. CERT security bulletins

Strategic analysis

- Answers “who” and “why:” Analyst takes functional analysis and compares it to vendor threat actor profiles to determine why the machine was compromised to predict the next possible target



Overcoming Challenges

Education

Current state

- BA, MS in intelligence
 - Limited cyber focus

Future potential

- Undergraduate
 - Major vs. minor
- Graduate
 - Certificate
 - Master's program



Training

Current state

- Limited cyber specific paths for analytical core - public or private
 - Ad-hoc training when time, \$ permit

Future potential

- Certification program
 - Mix functional and strategic
 - Implement life-long learning
 - Creativity to engage adult learners



Software Engineering Institute
CarnegieMellon



Gap Analysis – 2 – back

Competency	Skill
Critical Thinking	Problem Definition
	Diversity of Perspective
Data Collection & Examination	Defending Assessments
Communication & Collaboration	Defending Assessments
	Debating Skills
	Knowing your Audience
	Attention to Detail
	Assimilate New Information
Technical Exploitation	Malware
	Web Servers
	Web Applications
Information Security	Information Architecture
Computing Fundamentals	Databases
	Scripting

