A Preliminary Study on the Curriculum Overlap and Gap Between LIS Education and Intelligence Education

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This paper addresses the curriculum overlap and gap between LIS education and intelligence education by analyzing the content of the websites of the intelligence education programs and courses in 27 representative intelligence education universities in the United States, and the intelligence-related programs and courses in the 56 LIS programs in the United States and Canada. The curriculum overlap lies in computer skills for information collection management, geographic information systems, data mining, knowledge discovery, competitive intelligence and information security, whereas the major curriculum gap lies in most intelligence analysis domain areas (such as military intelligence, political intelligence, science and technology intelligence) and many intelligence tradecraft areas (such as structured analytic techniques, intelligence theory and methods, intelligence policy and organization, intelligence operations, counterintelligence, intelligence writing and briefing). By filling some curriculum gaps based on the overlap, LIS education can extend to open source intelligence analysis in some domain areas.

Keywords: LIS curriculum, LIS education, intelligence education, information analysis, content analysis of websites

Introduction

As direct responses to the September 11, 2001, tragedy, we have seen a large demand for intelligence analysts (CNNMoney, 2009; Reid, 2009) and the rapid increase of intelligence studies education programs across the United States (Spracher, 2009). Meanwhile, many LIS schools have been redefining themselves in the changing, complex, knowledge-based environment and have reviewed and modified their curricula to keep abreast with the changing demands of the job market (Jin & Bouthillier, 2012). Several LIS educators have advocated intelligence analysis (including competitive intelligence analysis) as an alternative path for information professionals (Dillon & Doty, 2012; Edna, 2009; Hohhof & Chitwood, 2000; Shelfer & Goodrum, 2000), and there are LIS schools (such as the Information School at University of Texas at Austin) that have started intelligence analysis programs (Dillon & Doty, 2012). A prerequisite for LIS education to be able to extend to intelligence education is the curriculum overlap between the two fields.

The motivation of this study is to provide curriculum support to the idea of extending LIS education to intelligence education. It does not try to answer the practical questions of why LIS education should extend to intelligence education and whether or not the production of current United States intelligence education programs serve the job market with sufficient graduates. There is sporadic, qualitative evidence supporting the idea. For example, Reid (2009a) addressed a "critical shortage of intelligence analysts" in many of the 16 U.S. intelligence community agencies (p. 40). Intelligence analysts, who are involved in identifying,

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evaluating, and analyzing information for decision makers in the intelligence community, were identified by CNNMoney.com as among the ten best jobs in America in 2009 (CNNMoney, 2009; Reid, 2009). The author found some intelligence analysis job announcements related to LIS (see Appendix A for the gist of such an example job announcement posted in March 2011). The example position has two categories of duties: (1) information collection, cataloging, and storage; and (2) information analysis for decision making or recommendation. A typical Master of Library and Information Science (MLIS) program prepares students for the first category of the duties, but not the second. However, the author has not found quantitative data to answer the two practical questions. Answering those questions require a separate study.

The research question of this study is: what curriculum overlap and gap are there between intelligence education and LIS education? Following a literature review addressing the connection between intelligence analysis and LIS with a focus on the relationship between LIS education and intelligence education, the paper addresses the methodology of the study, followed by data analysis and findings, and the conclusion and limitations.

Throughout the paper, the term *intelligence education* refers to intelligence studies programs in the United States with a mission of educating intelligence analysts. The Mercyhurst College Department of Intelligence Studies defines *intelligence* as a process, using (primarily unstructured) information from all sources and focused externally, that is designed to reduce the level of uncertainty for a decision-maker (Mercyhurst College, 2012; Warner, 2009, p.17). Intelligence sources include open source, human intelligence, measurement and signature intelligence, signals intelligence and imagery intelligence (Clark, 2010). Therefore *intelligence analysis* is a process of gathering and analyzing information from all (covert and overt) sources. Most intelligence education programs in civilian universities are involved in the collection and analysis of intelligence from overt sources only, or open source intelligence analysis (sometimes also called open source information analysis). Regardless of the sources, the analysis (or analytical process) should be the same, which is "the application of individual and collective cognitive methods to weigh data and test hypotheses within a social-cultural context" (Johnston, 2005, p.4). In order not to introduce terminological confusion between intelligence analysis and information analysis, the paper uses intelligence analysis or open source intelligence analysis. Throughout the paper, *LIS education* refers to the library and information science education programs in the United States and Canada, accredited by the American Library Association (ALA). The author of the paper was a science and technology policy analyst with a duty similar to that of the Library of Congress Congressional Research Service (CRS, 2012).

Literature Review

This section addresses a brief literature review on the interrelation between LIS and intelligence analysis with a focus on the relationship between LIS education and intelligence education. There are only a few publications addressing the interrelation between the two. The review on the interrelation between LIS and intelligence analysis serves as a general background.

Williams and Lipetz (2005) compiled probably the earliest monograph that investigates the interconnection of intelligence and information science, the information-related aspects of intelligence, and the close relationship between intelligence work and the information professions.

Dillon and Doty (2012) identified some of the similarities between information studies and security and intelligence work, because "information follows a life cycle from creation, through organization, ac-

cess and use, to preservation," whereas intelligence work is also a process involving the identification of requirements, collection, processing and exploitation of information, analysis and production, consumption, and feedback" (p. 77). The similarities suggest that education for intelligence might fit well within information studies curricula. They also discussed how they made the development of an intelligence certificate (The Certificate of Advanced Study in Global Media and Research Analysis) a logical extension of the School of Information at University of Texas at Austin.

Jin and Bouthillier (2012) examined whether intelligence analysis as a topic can be integrated into LIS education. Their literature review indicates that "intelligence analysis and LIS have some complementary linkages. Potentially they can even have a synergistic relationship to achieve mutual enhancement. This constitutes the basis for a positive assumption that intelligence analysis can be integrated into LIS education" (p. 145). They accessed the webpages of 58 ALA-accredited LIS schools containing course information (e.g., listing of course titles and descriptions), and then retrieved any text strings including the word "intelligence," and found that "intelligence analysis and LIS intersect at competitive intelligence, and nearly 47% of ALA-accredited LIS schools have integrated some intelligence work content into their course offerings" (p. 145).

Reid (2009a) pointed out that the analytical skills required of intelligence analysts are somewhat similar to those of open source information researchers and/or political analysts, therefore information professionals can take intelligence analysis as an alternative career path by acquiring critical analytical skills required of intelligence analysts (Reid, 2009a, 2009b). Analytical competencies can be enhanced through on-the-job-training, self-study, certificate or master's degree in analysis (Reid, 2009b).

Spracher (2009, p. 234) listed the following core competencies for non-supervisory intelligence community employees at GS-15 and below (on the U. S. General Shedule): engagement and collaboration,critical thinking, personal leadership and integrity, accountability for results (including resource management), technical expertise (including professional tradecraft and subject matter expertise), and communication. Among these competencies resource management and professional tradecraft are related to LIS.

Table 1. Systematic Variables of Intelligence Analysis (Source: Johnston, 2003).

User Requirements	Information Archive	Analytical Methodology	Reporting
Operations	Storage	Approach	Methods
Information Acquisition	Access	Intuitive	Verbal
Collection methods	Correlation	Structured	Written
Overt	Retrieval	Semi-structured	
Covert		Information Processing	
Information Reliability		Historical information	
Reproducible		Current information	
Consistent		Decision Strategies	
Information Validity		Estimative	
Historical		Predictive	
Single Source			
Dual Source			
Triangulation			

Johnston (2003) developed a taxonomy of intelligence analysis variables, and the systematic variables (see Table 1) have strong connections to LIS. Among the variables in Table 1, information acquisition (information collection) and information archive (information storage, access, and retrieval) are closely related to LIS. Dillon and Doty (2012) also discussed the close relationship between information retrieval and intelligence analysis.

Chen (2005) proposed a need to develop the science of "intelligence and security informatics (ISI)"—"the study of the use and development of advanced information technologies, systems, algorithms, and databases for national security related applications, through an integrated technological, organizational, and policy based approach" (p. 218) in order to deal with the significant information overload problem in law enforcement, criminal analysis, and intelligence communities. Chen and Xu (2006) proposed a research framework addressing the technical challenges facing counter-terrorism and crime-fighting applications, with a primary focus on knowledge discovery from databases (KDD), and have identified and incorporated into the framework six classes of ISI technologies: information sharing and collaboration, crime association mining, crime classification and clustering, intelligence text mining, spatial and temporal analysis of crime patterns, and criminal network analysis. Reid (2009a, 2009b, 2011) mentioned that web mining analysis, web analytics, GIS tools, cataloging (or metadata tagging) are related subjects.

The Model IAFIE Basic Intelligence Analyst Training Standards (IAFIE, 2012) include structured analytic techniques, which include data exploitation/collation, issue/problem development techniques, visualization techniques (such as link analysis, pattern analysis, timeline analysis, commodity flow analysis), and alternative analysis techniques, so generally organization of data/information, and information visualization are subjects related to LIS. The International Association for Intelligence Education (IAFIE) was founded in 2004 with a mission of advancing research, knowledge and professional development in intelligence education.

From the literature review, we see that there are interrelations between LIS and intelligence analysis (Williams & Lipetz, 2005), similarities between information studies and security and intelligence work (Dillon & Doty, 2012), and complementary linkages between intelligence analysis and LIS with intersection at competitive intelligence (Jin & Bouthillier, 2012); that information professionals can be trained as intelligence analysts (Dillon & Doty, 2012; Hohhof & Chitwood, 2000; Reid, 2009a, 2009b); and that there are intelligence competencies and subjects that are related to LIS, including resource management and professional tradecraft (Spracher, 2009), information acquisition and archive (Johnston, 2003), intelligence and security informatics technologies (Chen & Xu, 2006), organization of data/information, and information visualization techniques (IAFIE, 2012). Based on the literature review, we can hypothesize that there must be some curriculum overlap and gap between LIS education and intelligence education.

Methodology

To answer the research question, the study here analyzes the content of the websites of the intelligence education programs and courses in representative intelligence education universities in the United States, and the intelligence-related programs and courses in the 56 LIS programs in the United States and Canada (excluding University of Montreal and University of Puerto Rico due to unavailability of English websites), and tries to find the curriculum overlap and gap between intelligence education and LIS education. The goal here is to find overlap of *subjects* because overlap of course titles can be unreliable and difficult to do, so the

first step is to find a list of subjects in intelligence education.

IAFIE is still discussing the accreditation of intelligence education programs, and has proposed very general standards for intelligence education which cover the following undergraduate degree core areas: intelligence history, intelligence institutions, intelligence planning, intelligence collection, intelligence analysis, counterintelligence, and security (IAFIE, 2011). There is no widely acknowledged intelligence education curriculum yet.

Spracher (2009) provided a list of 21 representative intelligence studies institutions in the United States. The website of IAFIE (iafie.org) listed 19 institutional members. The study here takes the 21 institutions in the United States, augmented by the IAFIE institutional members with an intelligence education program, and then examines their websites to find their programs and courses. There are a total of 27 such institutions in the study.

There is no standard to follow when judging whether a course in the LIS curriculum is related to intelligence education or not. The author has to develop an operational standard to advance the research by examining the existing literature, and then makes best judgments.

From the literature review above, we see that there are information collection/organization competencies that are *generally* or *loosely* related to intelligence, and are offered by almost all LIS programs, such as information collection or collection development, information resource management, information/knowledge organization, classification, cataloging, database management, and information retrieval and access. These general competencies lay a foundation for the interconnection between the LIS profession and intelligence work. There are also information processing/management competencies that are *particularly* or *closely* related to intelligence, and are not offered by all LIS programs, such as cryptography, data/text/Web mining, data analytics, knowledge discovery, social computing/informatics, information/data security, information forensics, safety/security informatics, information visualization, geographic information systems (GIS), competitive intelligence, and strategic information management. These competencies may function as a bridge between intelligence analysis and LIS.

This study examines the program and course webpages of the websites of the 27 representative intelligence education institutions, aiming to build preliminary taxonomies of education of intelligence tradecraft and intelligence analysis domain areas based on the literature review. The taxonomies are to be created using a bottom-up (data-driven) approach guided by the LIS competencies *generally* and *particularly* related to intelligence. The study then examines the program and course webpages of the websites of the 56 LIS programs in the United States and Canada (excluding University of Montreal and University of Puerto Rico), and applies the taxonomies to find intelligence-related courses in the LIS curricula, with a focus on the LIS courses *particularly* related to intelligence.

Data Analysis and Findings

Intelligence education programs and courses are identified based on their course titles, descriptions, programs and program requirements published on their websites. Analysis of the 27 representative intelligence education institutions and their course subject areas found that they offer intelligence analysis/studies degree/certificate programs (1 doctoral, 11 Master's, 10 Bachelor's, 1 Associate, 23 certificate programs), and other degree/certificate programs with major/minor or concentration in intelligence (1 doctoral, 7 Master's, 4 Bachelor's, 3 majors, 5 minors, 9 certificate programs). Those programs have concentrations on both intelligence tradecraft and domain areas. See Table 2 and Table 3 for a list of the tradecraft and domain ar-

Table 2. A Preliminary Taxonomy of Education of Intelligence Tradecraft.

- Counterintelligence
- Counterespionage
- Denial and deception
  - Foreign denial and deception
- Foreign language
- Intelligence theory and methods
  - Intelligence success and failure
- Intelligence policy and organization
- **Intelligence collection (or gathering)**
  - **Intelligence collection management**
    - **Computer skills (such as database management, information retrieval)**
    - **Organization of data/information/knowledge**
  - Technical collection of intelligence
    - Geographic information science and technology
      - **Geographic information system**
      - Geospatial intelligence
    - Measurement and signature intelligence
    - Signals intelligence
    - Sub-orbital platforms
- Intelligence operations
  - Interrogation techniques
- Intelligence processing
  - Cryptologic issues
  - **Digital image processing**
- Intelligence analysis
  - Structured analytic techniques
    - Data exploitation/collation
      - **Social network analysis, social computing, social informatics**
    - Issue/problem development techniques
    - Visualization techniques
      - **Information visualization**
    - Alternative analysis techniques
  - Information modeling and predictive decision making
    - **Data/Web/text mining, knowledge discovery**
  - Predictive intelligence methods
- Intelligence writing
- Intelligence briefing
- Spying
- Technologies in intelligence theory, communications, and research

Note: The highlighted terms are particularly related to LIS.

Table 3. A Preliminary Taxonomy of Education of Intelligence Analysis Domain Areas (including functional areas and geographical areas).

- American foreign policy
- American history and politics
- Criminal intelligence, criminal justice, law enforcement
  - **Cyber forensics, information forensics**
  - Financial investigation
  - Organized crime
  - White collar crime
- Economic intelligence
  - Business intelligence
    - **Competitive intelligence**
  - Finance
- Environment, energy, public health
- Military strategy/intelligence/operations
  - Defense politics
  - Maritime information and intelligence
  - Unconventional weapons and non-proliferation
- Political intelligence
- Protection management
  - Security
    - Corporate security
      - Executive protection
      - Physical security
      - Workplace violence
    - Disaster and bioterrorism
    - Homeland security, national security
    - Information security
      - Information protection and security
      - Cyber conflict, cyber security
      - **Cryptography**
      - **Safety/safety informatics**
    - International security
    - Terrorism studies (terrorism, counter-terrorism)
    - Threat assessment and management
    - US national security policy
- Science and technology intelligence
- Strategic intelligence
  - **Strategic information management**
- Geostrategic environment (or regional area) studies (International studies)
  - Africa studies
  - East Asia studies
  - Latin America Studies
  - Middle East Studies
  - Russia and Central Asia studies
  - Cultural intelligence

Note: The highlighted terms are particularly related to LIS.

eas, which were developed by examining those programs and courses based on the literature review. Although the organization of data, information, and knowledge is occasionally mentioned somewhere on those websites, a whole course on that topic is rarely found. The terms in the taxonomies are directly extracted from those program and course titles and descriptions, and the hierarchy is developed based on the author's best understanding of the relationships between the terms. Note that the taxonomies are created by the bottom-up, data-driven approach for the purpose of answering the research question of the study, and can be incomplete and biased due to the limited sample size. See Appendix B for a list of these 27 representative intelligence education institutions.

Table 4 lists LIS education institutions in U.S. and Canada that provide at least three intelligence related courses. Those courses are collected if their course titles, descriptions, and syllabi (very often not available) fall in the taxonomies presented in Table 2 and 3. This is not always easy. When a course (such as *Graphical Representation* of the North Carolina Central University) has a title and description that looks similar to but not the same as a certain intelligence subject (i.e., information visualization, or structured analytic techniques), a best (perhaps biased) judgment is made. Those courses serve as curriculum overlap between LIS education and intelligence education. In the intelligence tradecraft areas, the overlap lies in intelligence collection management (such as database management, information retrieval), GIS, structured analytic techniques, information modeling and predictive decision making (see Table 2); in intelligence analysis domain areas, the major overlap lies in competitive intelligence and information security (see Table 3). It is reasonable for a certain intelligence education program to focus on certain domain areas; so the key curriculum gap seems to lie in most intelligence analysis domain areas and many intelligence tradecraft areas (such as counterintelligence, intelligence theory and methods, intelligence policy and organization, intelligence operations, structured analytic techniques, and intelligence writing and briefing).

Table 4. LIS Education Institutions that Provide at Least Three Intelligence Related Courses.

iSchools/LIS Schools	Intelligence Analysis Education Programs/Plans	At Least Three Typical Courses Related to Intelligence Analysis
Syracuse University School of Information Studies http://www.ist.syr.edu Federal Designation in Information Assurance Education	1. Bachelor of Information Management & Technology with concentration in information security 2. Master of Science in IM with specialization in data management 3. Master of Science in IM with specialization in information security 4. Certificate of Advanced Study in Information Security Management	IST 522 Applied Information Security IST 565 Data Mining IST 626 Business Information Resources & Strategic Intelligence IST 647 Digital Forensics IST 659 Data Administration Concepts and Database Management IST 728 Information Security Policy

(continued)

Table 4 (continued). LIS Education Institutions that Provide at Least Three Intelligence Related Courses.

iSchools/LIS Schools	Intelligence Analysis Education Programs/Plans	At Least Three Typical Courses Related to Intelligence Analysis
University of Texas at Austin School of Information http://www.ischool.utexas.edu	Certificate of Advanced Study in Global Media and Research Analysis	Courses provided by 4 schools/departments: competitive intelligence, LIS and intelligence gathering, security informatics, federal information policy, public policy, GIS
Catholic University of America School of Library and Information Science http://slis.cua.edu/courses/courses.cfm	Building up an intelligence analysis education program	LSC 522 Information Analysis and Communication. LSC 524 Actionable Intelligence: Information Analysis and Communication CLSC 874 Competitive Intelligence
Drexel University College of Information Science and Technology http://www.ischool.drexel.edu/Home/Academics/CourseDescriptions/List	Post-Master's Specialist Program in Competitive Intelligence and Knowledge Management	INFO333 Introduction to Information Security INFO373 Digital Forensics INFO633 Information Visualization INFO634 Data Mining INFO678 Competitive Intelligence INFO710 Information Forensics INFO780 ST: Intro to GIS INFO780 ST: Social Informatics
University of Washington Information School http://ischool.uw.edu/courses/descriptions	The iSchool participates in the Institute for National Security Education & Research	INFO 424 Information Visualization and Aesthetics IMT 552 Information Assurance Risk Assessment & Management IMT 570 Analytic Methods for Information Professionals INFX 598 C/E - Business Intelligence
University of Pittsburgh School of Information Sciences www.ischool.pitt.edu/	Master of Science in Information Science Certificate of Advanced Study in Information Security Certificate of Advanced Study in Geoinformatics	IS 2150 Introduction to Security IS 2170 Cryptography IS 2620 Developing Secure Systems IS 2621 Security Management IS 2801 Geospatial Information Systems IS 2160 Data Mining
University of North Carolina School of Information and Library Science http://sils.unc.edu/courses	None	INLS 541 Information Visualization INLS 566 Information Security INLS 613 Text Mining

(continued)

Table 4 (continued). LIS Education Institutions that Provide at Least Three Intelligence Related Courses.

iSchools/LIS Schools	Intelligence Analysis Education Programs/Plans	At Least Three Typical Courses Related to Intelligence Analysis
Wayne State University School of Library and Information Science http://students.slis.wayne.edu/classes/descriptions.php	None	7490 Competitive Intelligence and Data Mining 7491 Data Analytics 7492 Information Visualization
University of Maryland, College Park, College of Information Studies http://ischool.umd.edu/content/course-descriptions	None	INFM 620 Introduction to Strategic Information Management INFM 714 Principles of Competitive Intelligence INFM 741 Social Computing Technologies and Applications LBSC 705 Information for Decision-Making
Indiana State University School of Library and Information Science http://www.slis.indiana.edu	None	• Introduction to Geographic Information • Structural data mining and modeling • Strategic Intelligence • Information Visualization
University of British Columbia School of Library, Archival and Information Studies http://www.slais.ubc.ca/courses/courses-summary.htm	None	ARST 575H Information Visualization and Visual Analytics ARST 575J IT Security, Information Assurance and Risk Management LIBR 559N Text Analytics
University of Hawaii Information and Computer Sciences Department, LIS Program www.hawaii.edu/lis	None	ICS 464 Introduction to Cognitive Science ICS 623 Data Security ICS 624 Advanced Data Management ICS 691 Social Computing
University of Illinois Graduate School of Library and Information Science www.lis.uiuc.edu	None	LIS490GI Geographic Information Systems LIS590AC Applied Business Research [Competitive Intelligence & Knowledge Management] LIS590DT Data Mining LIS590ST Strategic Information Management LIS590TVT Safety Informatics LIS590TX Text Mining LIS590X20 Information Visualization

(continued)

Table 4 (continued). LIS Education Institutions that Provide at Least Three Intelligence Related Courses.

iSchools/LIS Schools	Intelligence Analysis Education Programs/Plans	At Least Three Typical Courses Related to Intelligence Analysis
North Carolina Central University School of Library and Information Science http://www.nccuslis.org/courses/coursesd.htm	None	LSIS 5440 Data-mining and Management with Statistical Analysis Applications LSIS 5442 Network Security LSIS 5883 Graphical Representation
Rutgers University School of Communication and Information – MLIS Program http://www.scils.rutgers.edu	None	• Competitive Intelligence • Information Visualization and Presentation • Social Informatics
Simmons College Graduate School of Library and Information Science http://www.simmons.edu/gslis	None	LIS 421 Social Informatics LIS 530M Competitive Intelligence LIS 593D Information Visualization

Note: All websites accessed in the period between 6/4/2012 and 6/12/2012.

From Table 4, we find that most intelligence related courses in iSchools/LIS Schools do not carry a title with the term "intelligence" in it with two exceptions. One exception is competitive intelligence (which is generally developed inside iSchools/LIS schools without the influence of the intelligence education community), and the other is the three courses with "intelligence" in their titles which are offered by the University of Texas at Austin, Catholic University of America, and Indiana State University. This verifies the following two phenomena:

1. Intelligence (except competitive intelligence) is not a widely used term in LIS curricula. Due to discipline difference, intelligence analysis deals with intelligence and information and produces actionable intelligence, whereas LIS deals with information and treats intelligence analysis as an extension.
2. Even though intelligence analysis and LIS share some curriculum overlap, the two sides often did not communicate with each other until recently after the 9/11 tragedy. The overlapped curricula (even with competitive intelligence) were mostly the result of their parallel development in their own disciplines. However, at least three iSchools/LIS schools (i.e., University of Texas at Austin, Catholic University of America, and University of Washington) have intelligence related courses that are influenced by the intelligence community.

From Table 4, we also find that five iSchools/LIS schools (i.e., Syracuse University, University of Texas at Austin, Drexel University, University of Pittsburgh, and University of Washington) have just started their intelligence education programs with concentrations in information security, information policy, and competitive intelligence. Some of those extended programs are probably the result of the communication with the intelligence community. However, from the curricula, it seems that they do not aim to develop fully blown intelligence education programs to be strong competitors of current intelligence education providers. Instead, they seem to extend to intelligence education

very carefully based on their current curricular strengths and focus on a few concentration areas (such as information security and competitive intelligence). The Catholic University of America and probably more LIS education institutions are building up their intelligence education programs. Ten iSchools/LIS Schools provide at least three courses related to intelligence analysis, but have no intelligence education programs yet.

Conclusion and Limitations

There are interrelations between LIS and intelligence analysis, and between LIS education and intelligence education. This study investigates the curriculum overlap and gap with a motivation of extending LIS education to open source intelligence analysis, by examining the websites of the intelligence education programs and courses in 27 representative intelligence education institutions in the United States, and the intelligence-related programs and courses in the 56 LIS programs in the United States and Canada. General intelligence competencies (such as information collection management, organization of data/information/knowledge, classification, and cataloging) are offered by almost all LIS programs. The particular curriculum overlap in the intelligence tradecraft areas lies in computer skills for information collection management (such as database management, information retrieval), GIS, and information modeling (such as data/text mining, knowledge discovery), structured analytic techniques (such as information visualization, social network analysis), whereas the overlap in intelligence analysis domain areas lies in competitive intelligence and information security.

It is a fairly new phenomenon for LIS education to extend to intelligence education. Five LIS education institutions have just started their intelligence analysis programs, and at least one more has started to build up such programs. Ten LIS education institutions have provided information processing/management competency courses that are *particularly* or *closely* related to intelligence analysis, such as data/text/Web mining, knowledge discovery, social network analysis, information security, information forensics, security informatics, information visualization, geographic information systems (GIS), competitive intelligence, and strategic information management.

Due to discipline differences, there is a large curriculum gap between intelligence analysis and LIS. The key curriculum gap seems to lie in most intelligence analysis domain areas (such as military intelligence, political intelligence, science and technology intelligence) and many intelligence tradecraft areas (such as counterintelligence, intelligence theory and methods, intelligence policy and organization, intelligence operations, structured analytic techniques, intelligence writing and briefing). However, LIS education does not seem to aim to develop fully blown intelligence education programs to be strong competitors of current major intelligence education institutions. LIS education mainly deals with information and treats intelligence education as an extension, and seems to extend to intelligence education very carefully based on their current curricular strengths and concentrate on a few domain areas such as information security and competitive intelligence. It is unknown whether LIS education aims to enter the intelligence community mainly to complement their competency.

LIS education can extend to open source intelligence analysis by filling the curriculum gap (more or less) based on the curriculum overlap through cooperating with the intelligence community and coordinating with related departments inside the education institution. Intelligence education itself is not mature yet. IAFIE has just published an intelligence education standard, and accreditation of intelligence education is still under discussion. Intelligence analysts are in high demand. On one hand, it

is an opportunity for LIS educators to participate in the development of intelligence education, and to train LIS professionals to be intelligence analysts who can work in the intelligence community and as open source intelligence analysts who can work in government, business, and other fields. On the other hand, LIS professionals with intelligence education can complement and strengthen the intelligence community by bringing in their information collection management and information organization skills. Of course, LIS education does not have to fill the entire curriculum gap, but analytical skills required of intelligence analysts need to be added into the LIS curricula in order to extend LIS education to intelligence analysis. The following are some approaches identified through the literature review and content analysis of the websites of the five iSchools/LIS Schools that have just started their intelligence analysis programs:

1. Building up intelligence analysis curriculum by adding intelligence tradecraft courses. This can be done by recruiting retired intelligence practitioners as adjunct or visiting professors. The University of Texas at Austin and Catholic University of America took this approach to build up their intelligence analysis curricula.
2. Applying for a grant from the Office of the Director of National Intelligence (ODNI) to set up a U.S. Intelligence Community Centers of Academic Excellence. The University of Washington took this approach.
3. Strengthening certain intelligence domain areas by coordinating with other programs inside the same university. The University of Texas at Austin's intelligence analysis certificate program provides courses from four schools/departments in the university; University of Washington's Information School participates in the Institute for National Security Education & Research with nine other units in the university.
4. Building up relations with the intelligence community to provide students with internship and capstone project experience, and career opportunities.

There are two major limitations in this study. First, the preliminary taxonomies of education of intelligence tradecraft and intelligence analysis domain areas were created using a bottom-up (data-driven) approach by examining the programs and courses of the 27 intelligence education institutions based on the literature review. The taxonomies are subjective and can be biased and incomplete due to limited sample size. Second, the LIS courses were judged by their titles and brief descriptions on whether they are related to intelligence analysis or not. Courses may have different content even with the same title. Sometimes it is very difficult to make a good judgment based on its short description when the course title looks like intelligence-related. Courses are best judged by syllabi which are very often not available on the surface web. Subjectivity and biases may have been introduced in the judgment.

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Appendix A. A Gist of the Intelligence Analysis Job Announcement (originally posted at http://jobview.usajobs.gov)

Job Title:
Intelligence Research Specialist

Department:
Department Of Justice

Agency:
Drug Enforcement Administration

Job Announcement Number:
F-DEA-NC-11-504419-DEU

Duty Locations:
1 vacancy - Baton Rouge, LA

Duties:

Collects or receives intelligence data from a variety of sources and prepares the materials for review, cataloging, and storage. Evaluates potential sources of information, and addresses significant gaps in data.

Determines and defines essential elements of information required and the most effective method for carrying out data collection efforts. Plans, coordinates, and/or conducts the collection and analysis of strategic and tactical intelligence in support of criminal investigative activities.

Analyzes intelligence reports and data to make decisions or recommendations.

Develops strategies for major areas of uncertainty in domestic and international political, social, or economic policies, trends, or situations.

Plans, develops, organizes, and conducts special research studies providing comprehensive assessments of broad, exceptionally complex, or highly sensitive issues within the assigned area. Develops methods of evaluating the validity, accuracy, and reliability of a broad array and high volume of information, for translation into intelligence relevant to the organization. Analyzes the significance and policy implications of issues in the assigned area.

Appendix B. Representative Intelligence Education Institutions

Intelligece Education Organization	URL
Graduate Degree in Intelligence Studies/Analysis	
Mercyhurst College Institute for Intelligence Studies	http://mciis.org http://intel.mercyhurst.edu
American Military University	http://www.amu.apus.edu
National Intelligence University	http://www.ni-u.edu
Johns Hopkins University School of Education Division of Public Safety Leadership	http://psl.jhu.edu/programs/msintelligenceanalysis/
Penn State University	http://www.psu.edu http://www.worldcampus.psu.edu/degrees-and-certificates#grad-masters
Henley-Putnam University	http://www.henley-putnam.edu
University of Texas at El Paso College of Liberal Arts, Intelligence and National Security Studies Program	http://academics.utep.edu/Default.aspx?alias=academics.utep.edu/inss#
Undergraduate Degree in Intelligence Studies/Analysis	
Point Park University School of Arts and Sciences Department of Criminal Justice & Intelligence Studies	http://www.pointpark.edu/Academics/Schools/SchoolofArtsandSciences/Departments/CriminalJusticeandIntelligenceStudies/IntelligenceandNatio
Embry-Riddle Aeronautical Univ.	http://prescott.erau.edu/degrees/undergraduate/global-security-intelligence-studies/index.html
Advanced Technical Intelligence Center for Human Capital Development (ATIC), Beavercreek, Ohio	http://www.atichcd.org
Other Degree with Major/Minor in Intelligence	
New Mexico State University	http://www.nmsu.edu/~govdept/graduate-minor-.html http://business.nmsu.edu/wordpress/wp-content/uploads/2008/11/minor-in-intelligence-studies.pdf
Patrick Henry College	http://www.phc.edu/si.php

(continued)

Intelligece Education Organization	URL
Other Degree with Major/Minor in Intelligence (continued)	
Neumann College Division of Arts and Sciences	http://www.neumann.edu/academics/divisions/arts_sciences/dean_letter.asp
University of Mississippi Center for Intelligence and Security Studies	http://www.olemiss.edu/ciss/Academics/index.htm
Other Degree with Concentration in Intelligence or Integral Component of Program	
Notre Dame College History and Political Science Department	http://www.notredamecollege.edu/academics/academic-divisions/arts-and-humanities/history-political-science-dept/history-majors/intelligence-studies-emphasis
Georgetown University School of Foreign Services	http://sfs.georgetown.edu/academics
Trinity Washington University School of Professional Studies	http://www.trinitydc.edu/academic-catalog/iss/
West Virginia University College of Arts and Sciences	http://internationalstudies.wvu.edu/major/curriculum/intelNC
Graduate/Undergraduate Certificate in Intelligence	
Air Force Institute of Technology (AFIT) Center for MASINT Studies and Research (CMSR)	http://www.afit.edu/en/CMSR/
California State University (San Bernardino) College of Social and Behavioral Sciences National Security Studies Program	http://nss.csusb.edu
Other Degree with Electives in Intelligence	
University of Maryland School of Public Policy Center for International and Security Studies at Maryland	http://www.cissm.umd.edu
University of New Haven	http://www.newhaven.edu/5941
Yale University Jackson Institute for Global Affairs	http://jackson.yale.edu
American University School of International Service	http://www.american.edu/sis/
Hampden-Sydney College Wilson Center for Leadership in the Public Interest	http://www.hsc.edu/Wilson-Leadership/Military-Leadership.html
Florida International University Institute for Public Policy and Citizenship Studies, Program in National Security Studies	http://casgroup.fiu.edu/ippcs/pages.php?id=2198
US Coast Guard Academy	http://www.cga.edu