ORIGIN OF CRITICAL INFRASTRUCTURE PROTECTION
Analyse of Ted G Lewis
1. Abstract (not here)
2. Introduction (not here)
3. First theory: Abstract and comments of the subchapter “Origin”
4. Second theory: Formal concept analysis: Definition of key words
5. Third theory: Evolution
6. Information processing (at the moment just a short version)
7. Conclusion
8. Discussion
9. New problems (part of the methodology used)
10. References
METHODE USED: EVOLUTIONARY INDUCTION BY KARL R POPPER

• Input: Interesting problem
  • What is the origin of critical infrastructure protection (CIP) based on (1) professor Ted G Lewis’s course book, (2) formal concept analysis and (3) evolution?

• Interpretation models: Tentative theories:
  • Ted R Lewis’s book (Chapter 2: Origin)
  • Formal concept analysis
  • Evolution

• Information Processing:
  • Error elimination
  • Critical thinking

• Output:
  • New insight to the interesting problem
  • New problems
The origin of CIP: Communications: NCS (1963), NSTAC (1982)
(nothing for 20 years)
FEMA 1978
The importance of infrastructure (IS): 1988 Executive Order 12656
Terrorism was rising in 1990’s.
Homeland security and CIP: between 1993 and late 1995
The criticality of national IS became important in Executive Order EO-13010 in 1996
first definition of infrastructure ;The "Marsh Report" and Executive Order EO-13010 (1996)
Threats to these CI fall into two categories: physical threats and cyber threats
• CIS are owned and operated by the private sector, hence P3P. Hence also National IS Assurance Council (NIAC)
• Definition of CIS in PDD-63 rapid expansion after the attacks of 9/11
• P3P 1999: National IS Assurance Council (NIAC)
• Executive Order 13231 (October 2001) → President’s CIP Board (PCIPB).
  Without information systems, the U.S.
• 2002: Homeland Security Bill, establishing the new DHS for CIP
• PDD-63 → HSPD-7 2003: Rewrote the list of sectors and who is responsible
• HSPD-7 in-fighting among departments (?) and agencies
• The first objective: what is most critical
• Uncertainty remains as to what is critical and what is not
• HSPD-7: CIS Identification, Prioritization, and Protection.
• HSPD-7: focus on major incidents-ones ... For the first time
According to the formal concept analysis made in this article, the origin of CIP was the birth of protection of something underneath that has some shape and the shape is permanent and this something is a foundation to many thing and without which we cannot live (the life we want to live) and without which our systems will not function.

One (first) such CIS was and is one’s territory

The word “infrastructure” itself is just some 80 years old

The word “infrastructure” is a different thing than the phenomenon “infrastructure”
The great idea of evolution is based on the notion of time and change of system state

- 13.8 billion years: quarks (and electron) → subatomic particles → light atoms → stars and supernovas → heavy atoms → living cell (life) → multicellular organs → man and his organization → science and technology
- Man: clan (animal) (before 50,000 BC) → tribe (primitive) (after 50,000 BC) → state (historical) (after 3000 BC) → culture (modern) (after 1500 AD) and → global mankind (postmodern) (2000 AD)
- Technology: Tools → machines → systems and → systems of systems
EVOLUTION, SCIENCE AND CIP

- critical basic IS (territory) (always with life)
- A new info IS: The birth of modern language (some 50,000 years ago)
- commerce as a new networking application and a new IS (some 50,000 years ago)
- A new info IS: The invention of writing (some 5000 years ago)
- first applied CIS (rivers) (some 5000 years ago) and then others like basic roads, harbors, cities, ...
- A new info IS: The invention printing (500 years ago)
- critical scientific-technological IS (steam, petrol, electrical power; roads, railroads, harbors, airports, ...) (some 150 years ago)
- critical scientific-electronic info IS (telegraph and telephone systems and computers (some 150 years ago)
- the word “infrastructure” (1927)
- the word “critical infrastructure protection” (1997)
- A new info IS: the birth of global computer IS e.g. internet (some 20 years ago)
- science of CIP (Lewis) (about 10 years)
INFORMATION PROCESSING

- Lewis: No formal concept analyses
- Lewis: No evolution
- CIP not just man-made. This is of course a matter of definition
- CIP is not just word ”CIP”, it is a phenomenon with a history
- CIP came from somewhere. It has pre-phases, which have pre-phases, ...
- (more is needed of this staff)
- (and peoples and time and information and ...)
GENERAL CONCLUSIONS, ANSWER TO THE RQs

• **(1) Lewis**: The origin of CIP (in USA): Creation of the National Communications System (NCS) in 1963

• **(2) Formal concept analysis**: The origin of CIP was the birth of protection of something underneath that has some shape and the shape is permanent and this something is a foundation to many things and without which we cannot live and without which our systems will not function. First this kind of IS found in the article was territory

• **(3) Evolution**: The origin of CIP has to have (long) history and it is found to have over ten principal phases from physical infrastructures to social infrastructures to technological infrastructures and lastly to information technological infrastructures (cyber). Revolutions in the communication technology of mankind have also been always revolutions in the critical infrastructure of mankind
CONCLUSIONS FOR FINNISH CIP

• The origin of CIP (in USA) was the communication needs for US Government in time of global crises. This is interesting for Finnish emergency work or emergency work in general: first to need in time of crises is communication capacity (Ref. Virve, TUVE). Communication, training, ... (Catrina)

• Prioritizing is a problem in Finland as a part of CIP. It is interesting that it grow up as a problem also in the birth of US CIP history. The importance of prioritizing is to be noticed by the fact that later it was as a word in title in one of presidential orders in USA.

• The other interesting point regarding the president of USA is his many advice organs. Is this an application to use in Finland also?

• There have been seven regional exercises in Finland 2008 – 2012 that were focused on co-operation of telecommunication, power supply and contractor firms. One of six major problems found in the series of these exercises were prioritization in case of bigger emergencies.

• Public-Private-Partnership also grow up to an item in 1990’s in the USA CIP history. In Finland we had used this idea in CIP protection at least 60 years.
DISCUSSION

• This article is short with no long tradition or history. More information processing, meaning particularly critical thinking and particularly error elimination is needed.
• On the other hand extra theories, even if presented shortly, give always extra insight. This confirm Popper’s idea of evolutionary induction.
• As a very new theory of CIP, Lewis book is not widely used and widely tested theory, although used and tested as presented in the book. Still I did not find anything to correct in the basic theory of CIP, but that is not a big statement, because the chapter under my scrutiny was not the hearth of Lewis’s theory.
• I Did find some new insight to the origin of CIP
DISCUSSION

• Formal concept analysis: A more theoretical notion of CIP, not just list of things that are in the public or in documents of US Government. The integrated concept presented in this article can be used to determine what is CIP and what is not.
• The idea of evolution proved to be effective, ones again. Now we have in this article a bit longer history of CIP and its pre-phases.
• As modern experimental and mathematical science was born in the Renaissance, it is probable that critical infrastructure protection has its scientific “parentage” in that period.
• It is presented in the article that commerce was a new networking application and an infrastructure introduced some 50.000 years ago. This is at least the time to go back if we want to be really independent and in no contact with other far away people.
• It was noticed in the process of writing this article, that Popper’s evolutive induction, used as a basic analyzing tool in this article, is actually a cybernetic, information processing process. This confirms both cybernetics and Popper’s evolutive induction according to best practises of Popper’s evolutive induction!
NEW PROBLEMS

• The use of Popper’s evolutive induction requires that one has deep theories as a starting point. It is interesting that Popper does not provide such a list in his book (?). Some starting points are discussed in article for these theories.
• The phases that Lewis presents as the history of CIP were importance of communication systems, protection for natural disasters, birth of homeland security and the notion of CIP, definition of CIP, Public-Private-Partnership, prioritization, and federalism. Is there something evolutionary in these phases?
• Prioritization in CIP and emergency situations is a major problem. Lewis solves this for CIP in his book (network analyze), but is it also a solution for emergency situations?
REFERENCES


QUESTION AND / OR COMMENTS?
BELLOW THE CHAPTER "ORIGIN" OF LEWIS’S BOOK IN MORE DETAIL

(STILL MORE IN THE ARTICLE)
ABSTRACT OF THE SUBCHAPTER “ORIGIN”

• The origin of CIP: The creation of the National Communications System (NCS) in 1963 (Cuba Missiles Crises 1962)
• Next: Nat. Sec. Telecom. Advisory Committee (NSTAC) 1982
• twenty years: CIP a notion after these “communication acts”
• FEMA 1978: Hurricanes, earthquakes and terrorism
• FEMA’s first act on terrorism was in 1984
• The importance of infrastructure (IS): 1988 Executive Order 12656
• Terrorism was rising in 1990’s. World Trade Center 1993, Unabomber 1995...
• Homeland security and CIP: between 1993 and late 1995
ABSTRACT OF THE SUBCHAPTER “ORIGIN”

• The criticality of national IS and corresponding assets became important in Executive Order EO-13010 in 1996
• The "Marsh Report" and Executive Order EO-13010 (1996) provided the first definition of infrastructure and loosely described an IS as "a network of independent, mostly privately-owned, man-made systems that function collaboratively and synergistically to produce and distribute a continuous flow of essential goods and services." And a CI S as "an IS so vital that its incapacity or destruction would have a debilitating impact on our defense and national security."
• Threats to these CI fall into two categories: physical threats and cyber threats
• CI are owned and operated by the **private sector**, hence government and private sector work together (**P3P**). Hence also National IS Assurance Council (**NIAC**)
• Definition of CI in **PDD-63** went through rapid evolution and expansion after the attacks of 9/11
• **(jatka)**
• P3P 1999: National IS Assurance Council (**NIAC**) to bring industry and government closer together
• Executive Order 13231 (October 2001) → President‘s **CIP Board** (**PCIPB**). **Without information systems**, the U.S. Federal Government **could not continue to operate** in the event of an attack.
2002: Homeland Security Bill, establishing the new DHS for CIP
December 2003, PDD-63 → HSPD-7 (Homeland Security Presidential Directive #7), which rewrote the list of sectors and who is responsible
HSPD-7 was written (?) to address in-fighting among departments and agencies that may have felt left out of the National Strategy
The first objective of this Strategy is to identify and assure the protection of those assets, systems, and functions that we deem most `critical'
Uncertainty remains as to what is critical and what is not
HSPD-7: CIS Identification, Prioritization, and Protection.
HSPD-7: focus on major incidents-ones ... For the first time