WESTT: Analytical prototyping for command and control

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The human factor

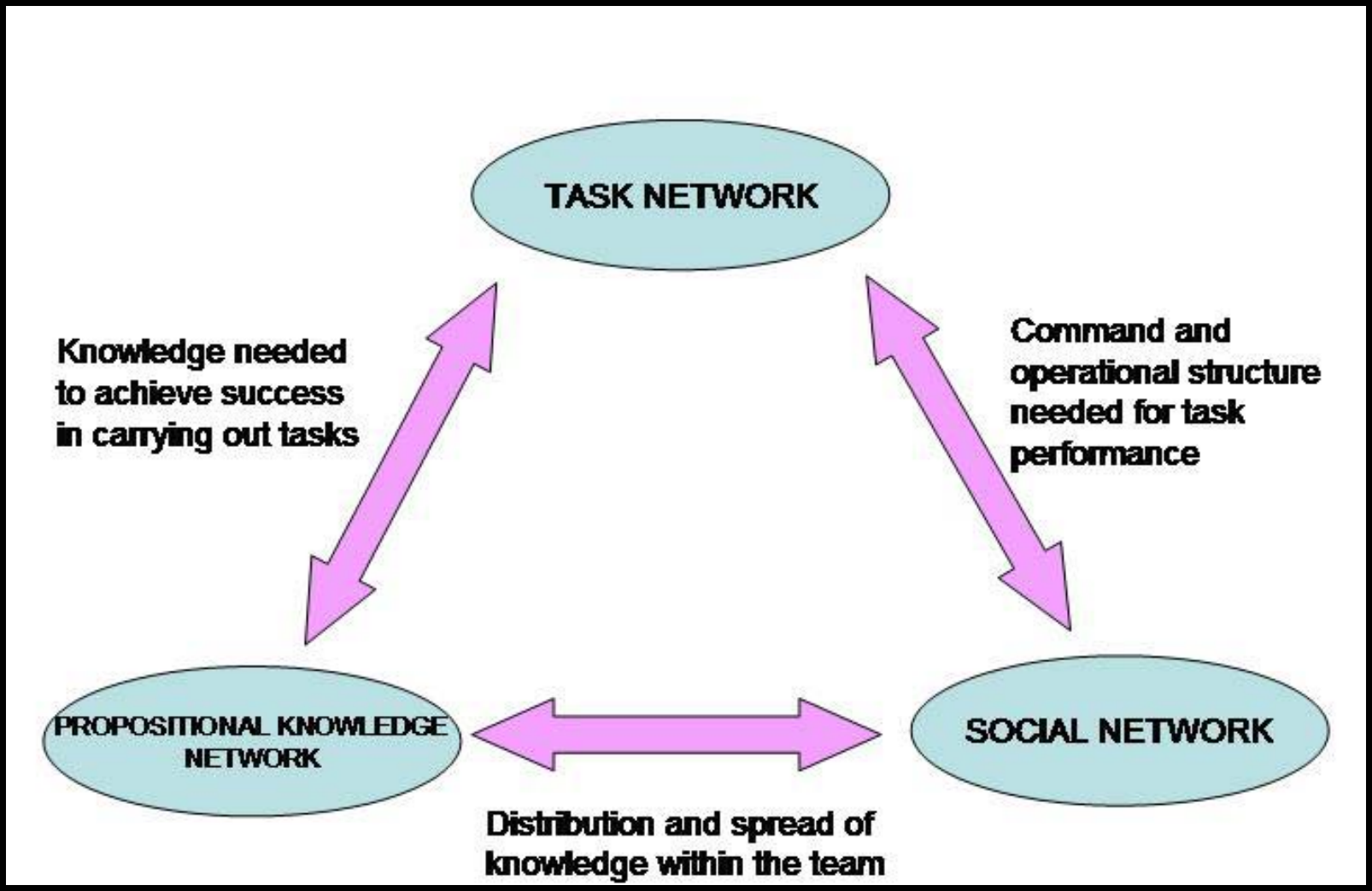
- NEC/NCW
  - Cognition as a function of the entire system
  - Flexible, agile teams

  "Doing things better *and doing better things"*
  - Handling complexity
- Impacts upon human factors/performance issues
  - W orkload
  - E rror
  - S ituation awareness
  - T ime
  - T eamwork

Aims and objectives

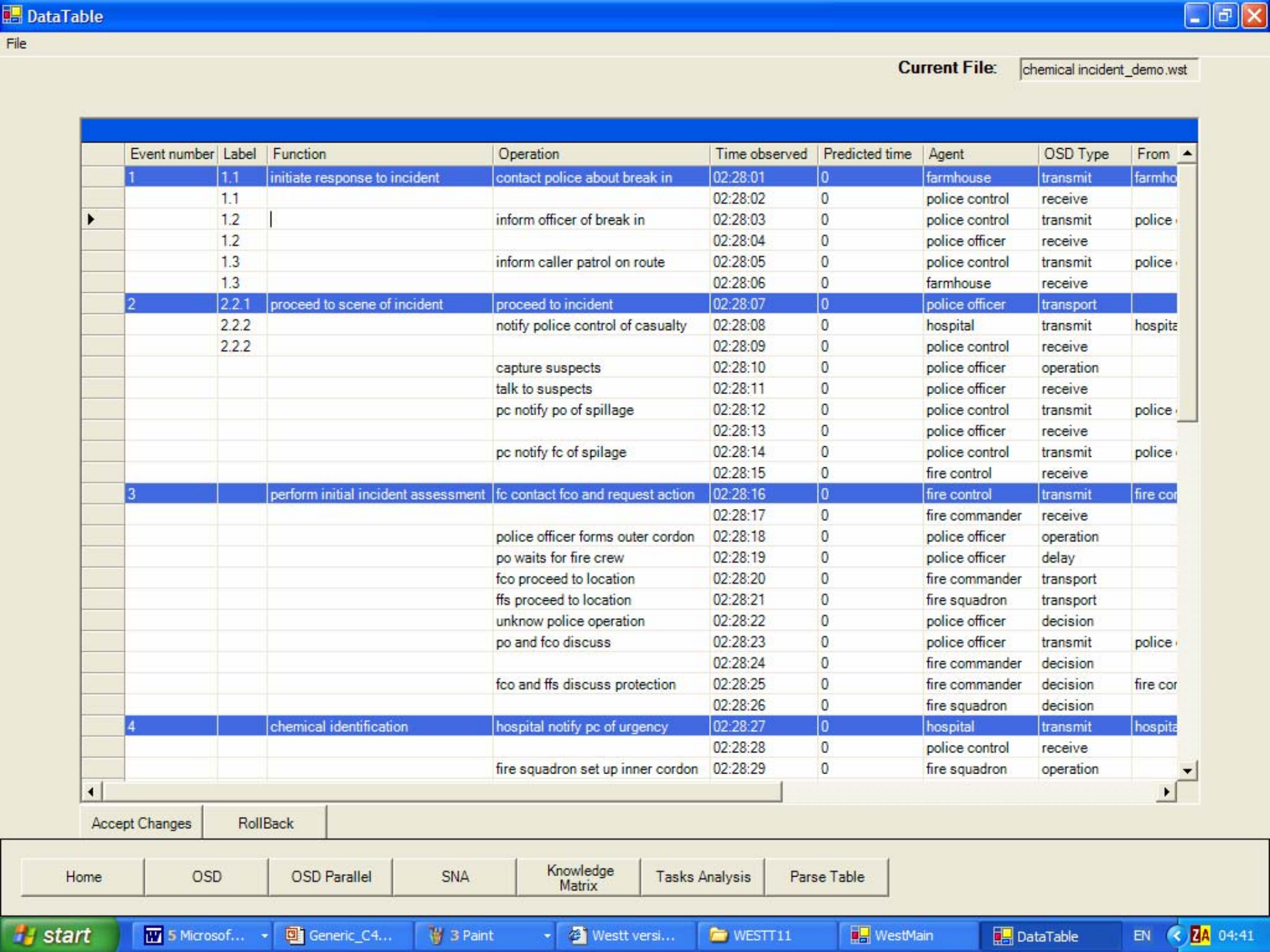
- System for examining NEC/C4 activity
  - Analysis of field studies and experiments
  - Supports ‘analytical prototyping’
    - Iterative manipulation of data to meet goals
  - Accessible to a wide population
    - NEC/NCW is an issue “for everyone”
  - Multilayered examination of data from different perspectives
  - Use of existing databases

Network of networks



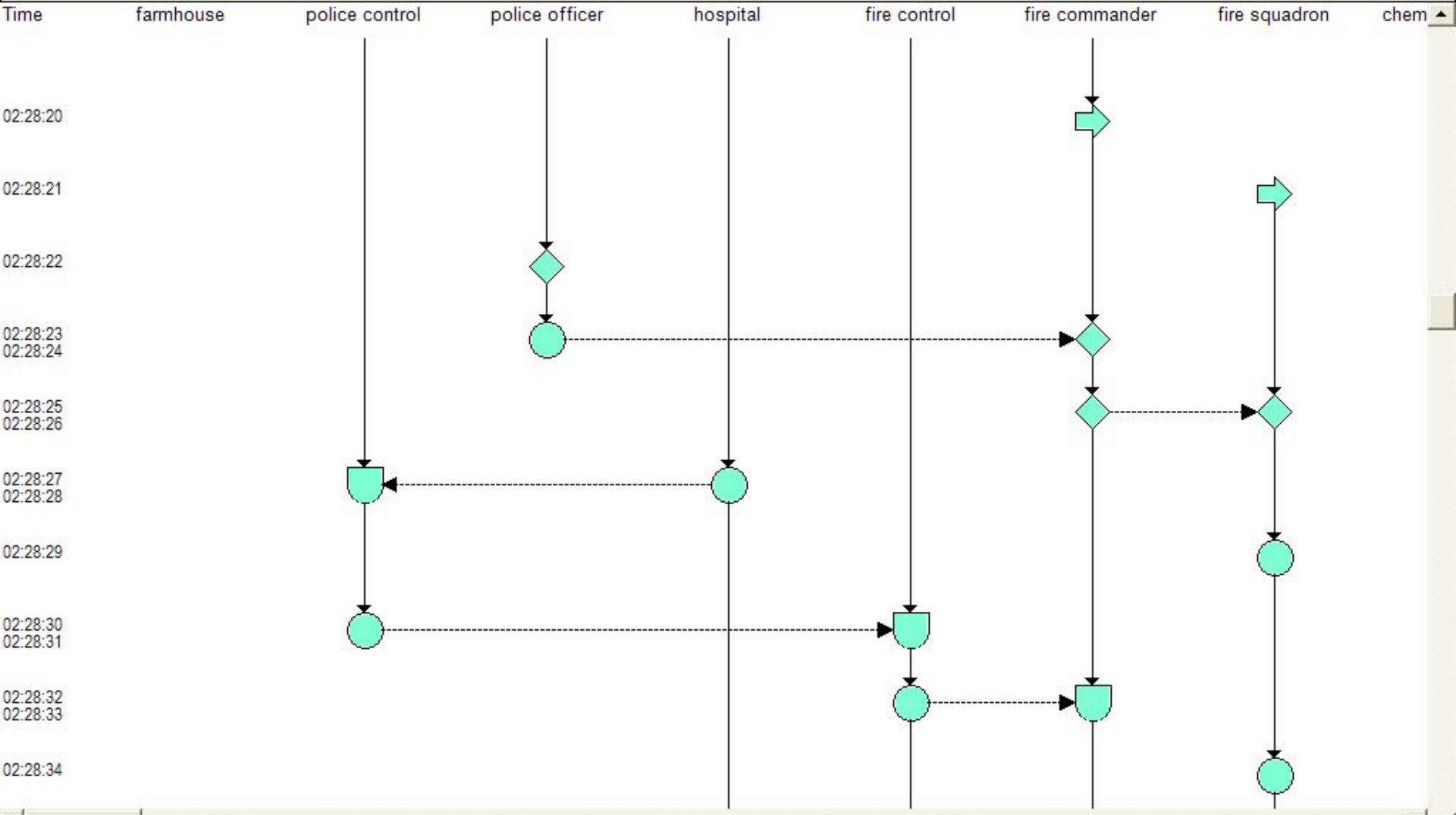
Task Network

- Workload
  - How many people, doing what, for how long?
  - Reference to databases of task loadings.
- Error
  - Error trees and cumulative risks
- Time
  - Actions and their ordering (critical path)


DataTable
File
Current File:
chemical incident_demo.wst
Event number
Label
Function
Operation
Time observed
Predicted time
Agent
OSD Type
From
1 1.1 initiate response to incident contact police about break in 02:28:01 0 farmhouse transmit farmho
1.1 02:28:02 0 police control receive
1.2 inform officer of break in 02:28:03 0 police control transmit police
1.2 02:28:04 0 police officer receive
1.3 inform caller patrol on route 02:28:05 0 police control transmit police
1.3 02:28:06 0 farmhouse receive
2 2.2.1 proceed to scene of incident proceed to incident 02:28:07 0 police officer transport
2.2.2 notify police control of casualty 02:28:08 0 hospital transmit hospita
2.2.2 02:28:09 0 police control receive
capture suspects 02:28:10 0 police officer operation
talk to suspects 02:28:11 0 police officer receive
pc notify po of spillage 02:28:12 0 police control transmit police
02:28:13 0 police officer receive
pc notify fc of spilage 02:28:14 0 police control transmit police
02:28:15 0 fire control receive
3 perform initial incident assessment fc contact fco and request action 02:28:16 0 fire control transmit fire co
02:28:17 0 fire commander receive
police officer forms outer cordon 02:28:18 0 police officer operation
po waits for fire crew 02:28:19 0 police officer delay
fco proceed to location 02:28:20 0 fire commander transport
ffs proceed to location 02:28:21 0 fire squadron transport
unknow police operation 02:28:22 0 police officer decision
po and fco discuss 02:28:23 0 police officer transmit police
02:28:24 0 fire commander decision
fco and ffs discuss protection 02:28:25 0 fire commander decision fire co
02:28:26 0 fire squadron decision
4 chemical identification hospital notify pc of urgency 02:28:27 0 hospital transmit hospita
02:28:28 0 police control receive
fire squadron set up inner cordon 02:28:29 0 fire squadron operation
Accept Changes
RollBack
Home
OSD
OSD Parallel
SNA
Knowledge Matrix
Tasks Analysis
Parse Table
start
5 Microsof...
Generic_C4...
3 Paint
Westt versi...
WESTT11
WestMain
DataTable
EN
04:41

OSD

Print | Copy To Clipboard

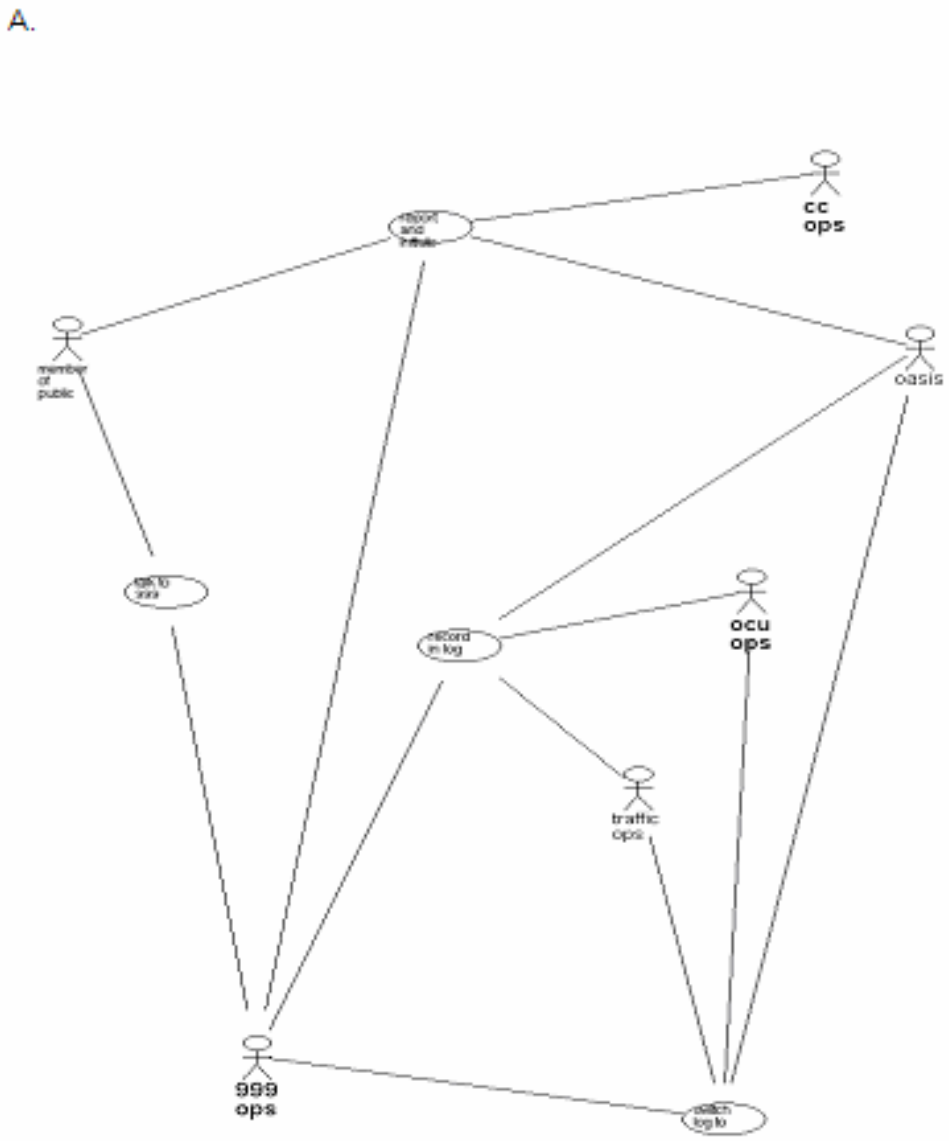


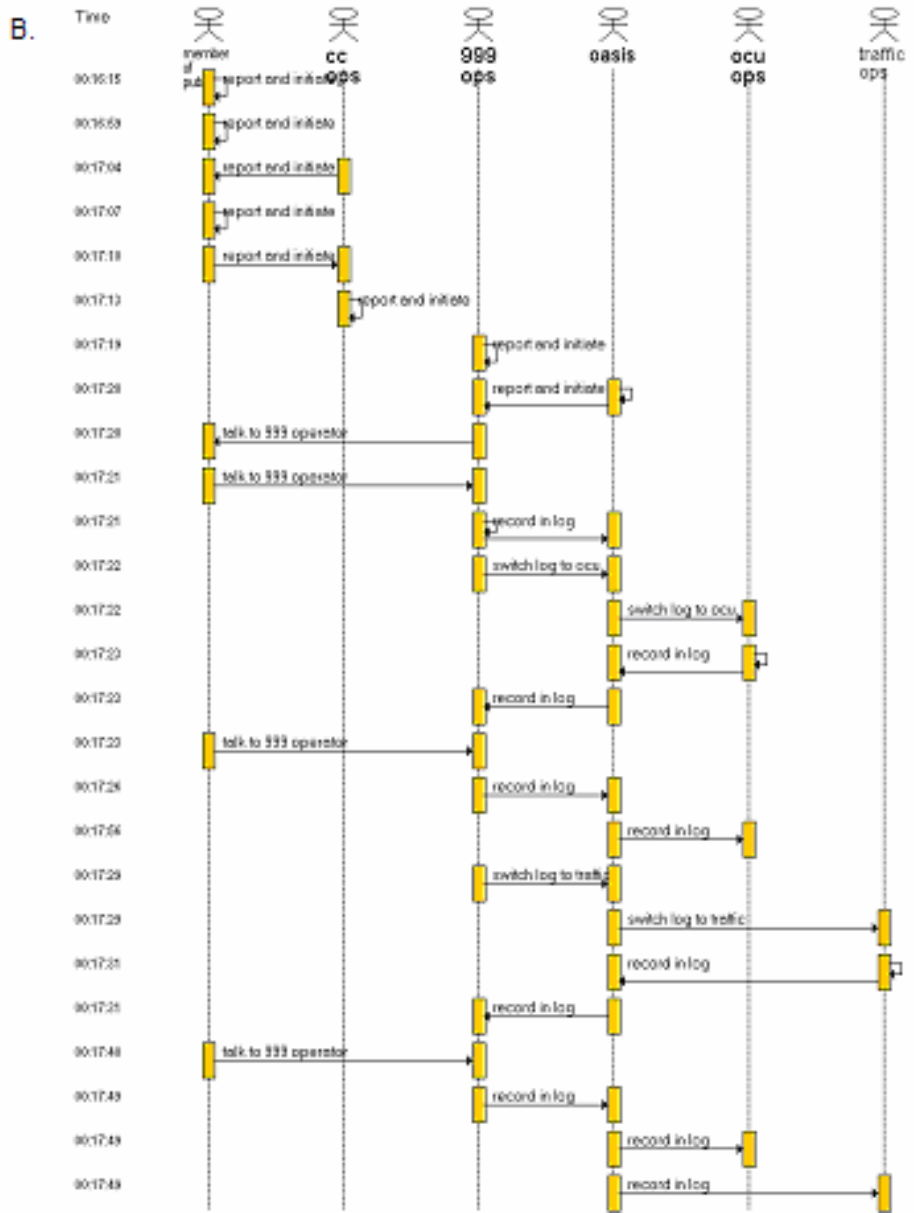
Home | Table | Analyse

start | 5 Microsof... | Generic_C4... | untitled - Paint | untitled - Paint | West Versio... | WESTT11 | 3 | EN | 00:38

A. UML Use Case

B. UML Sequence Diagram





Social Network

- Number of communications
  - Are individuals communicating as expected?
  - Communications workload (overload?)
- Centrality
  - Position within the topography of the network
- Sociometric status
  - Normalised measure of role in network as a function of communication load

SNA

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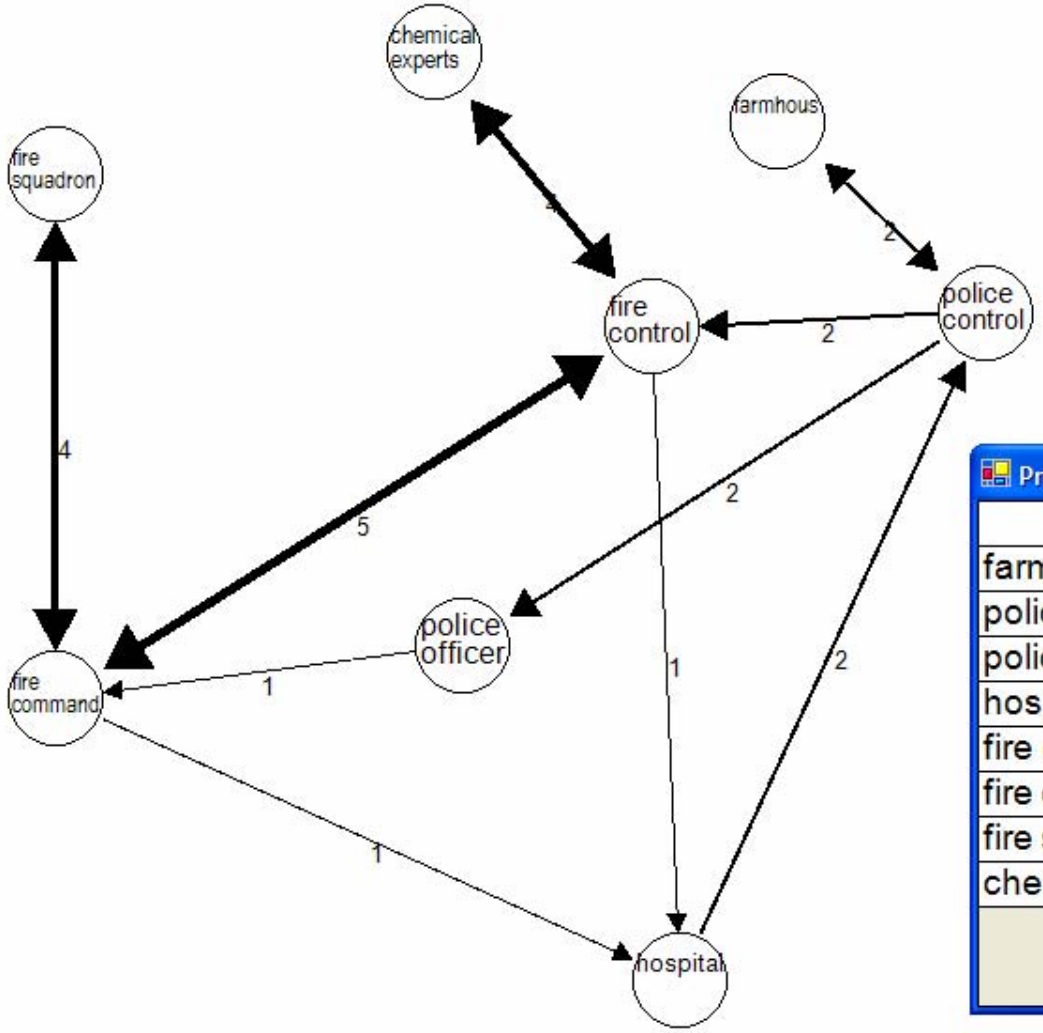


PrintSNAMatrix

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
farmhouse(A)	-	2	0	0	0	0	0	0
police control(B)		-	2	2	2	0	0	0
police officer(C)			-	0	0	1	0	0
hospital(D)				-	1	1	0	0
fire control(E)					-	5	0	4
fire commander(F)						-	4	0
fire squadron(G)							-	0
chemical experts(H)							0	-

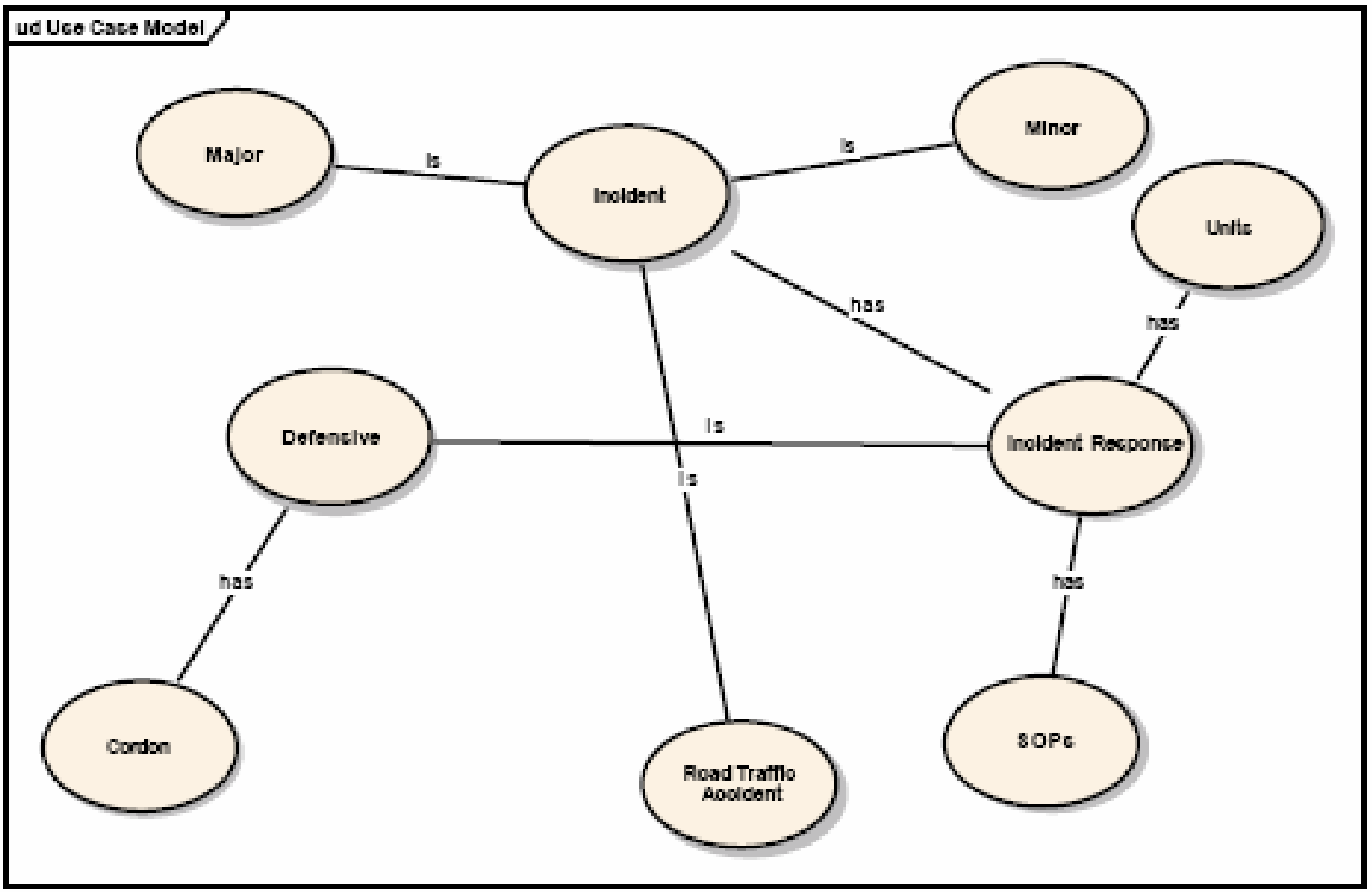
Print | Save To Excel | Return

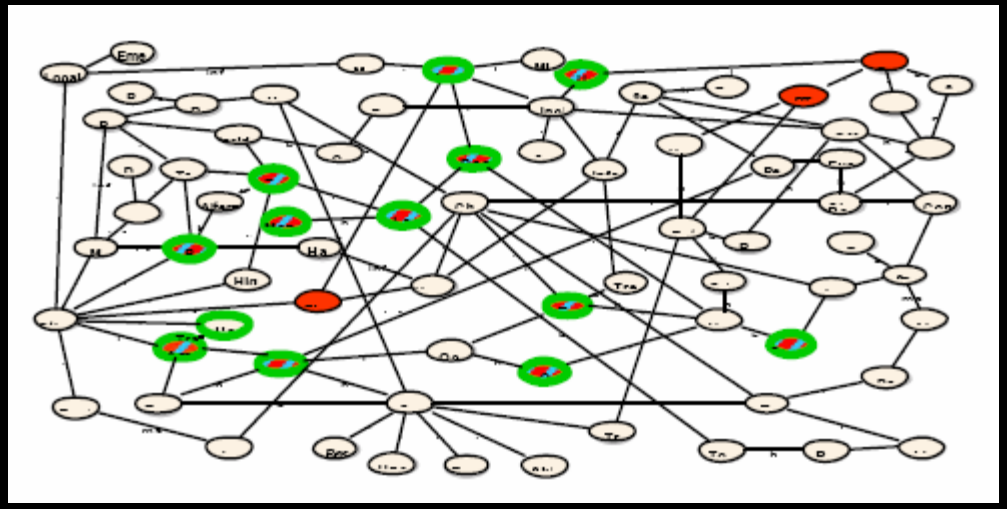
Home | Table | Matrix

start | 5 Microsof... | Generic_C4... | 3 Paint | West Versio... | WESTT11 | 5 | 2 Firefox | EN | 00:47

Knowledge network

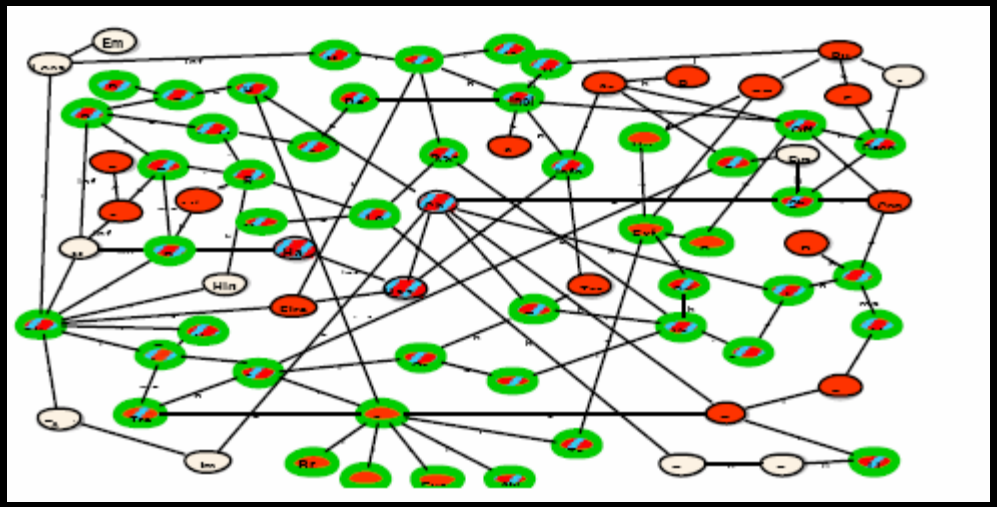
- Distributed cognition & shared information
  - Cognition as the processing, transformation and communication of information
  - Group phenomenon
  - Actors need not
    - Be fullly aware of the information they process
    - Control the process
- Challenge of representing conceptual space in which an operation occurs
- Measure of Situation Awarenes
    - Ownership of knowledge objects considered over time
    - Knowledge management issues if task/social network design is changed
    - Bound to both Task and Social networks

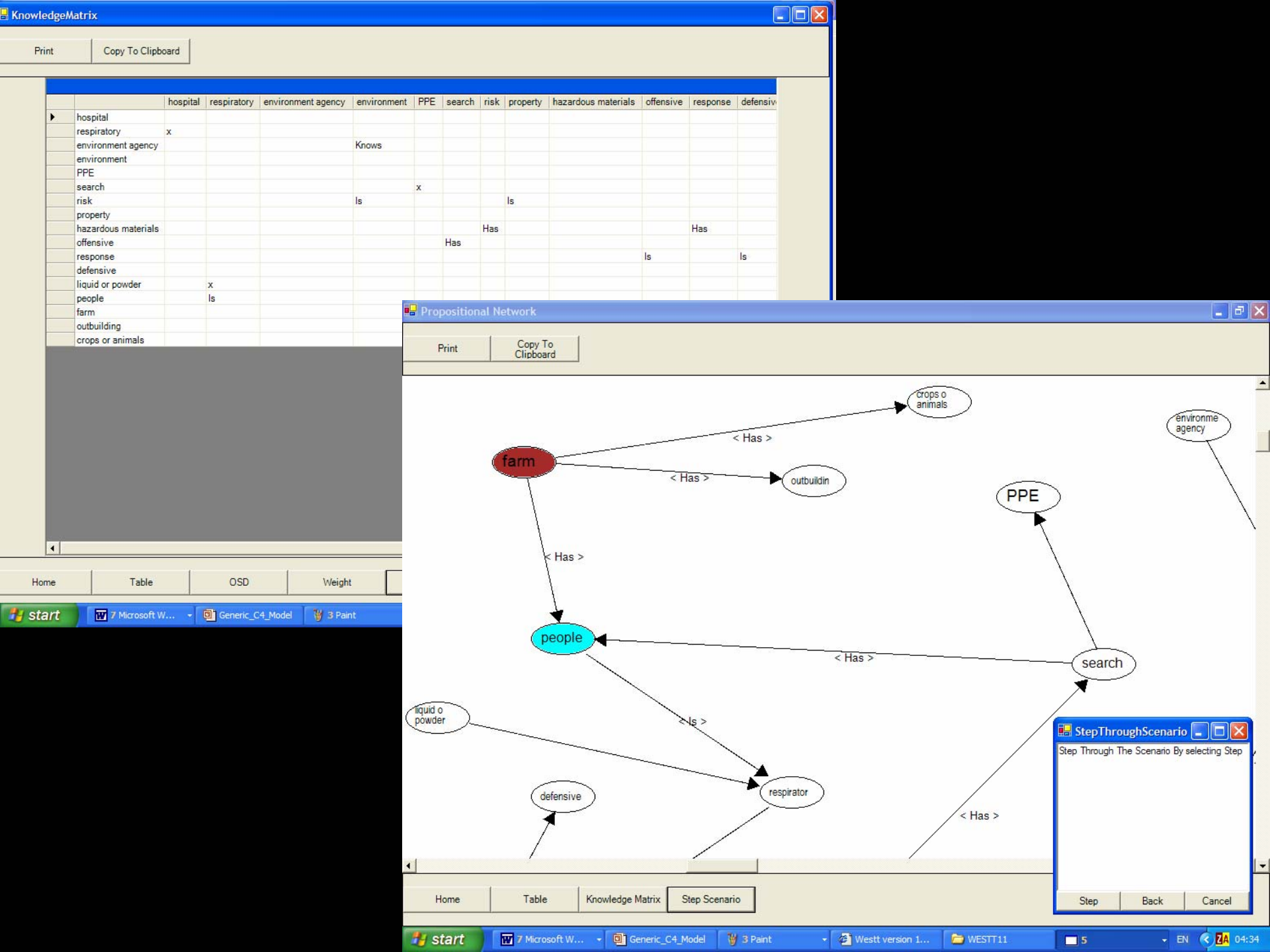

ud Use Case Model
Major
Is
Incident
Is
Minor
Units
has
has
Defensive
Is
Incident Response
Is
has
has
Cordon
Road Traffic Accident
SOPs



PHASE ONE

PHASE TWO




KnowledgeMatrix
Print
Copy To Clipboard
hospital
respiratory
environment agency
environment
PPE
search
risk
property
hazardous materials
offensive
response
defensiv
hospital
respiratory
x
environment agency
Knows
environment
PPE
search
x
risk
Is
Is
property
hazardous materials
Has
Has
offensive
Has
response
Is
Is
defensive
liquid or powder
x
people
Is
farm
outbuilding
crops or animals
Home
Table
OSD
Weight
start
7 Microsoft W...
Generic_C4_Model
3 Paint
Propositional Network
Print
Copy To Clipboard
crops o animals
< Has >
environme agency
farm
< Has >
outbuildin
PPE
< Has >
people
< Has >
search
liquid o powder
< Is >
respirator
defensive
< Has >
StepThroughScenario
Step Through The Scenario By selecting Step
Step
Back
Cancel
Home
Table
Knowledge Matrix
Step Scenario
start
7 Microsoft W...
Generic_C4_Model
3 Paint
Westt version 1...
WESTT11
5
EN
04:34

Conclusions

- Human factors and cognition as a systemic aspect of NEC/NCW
- WESTT software
  - Theoretical framework **and** the tool to do it
  - Rapid analytical prototyping
- Software available on request
- Already used in a range of projects
  - Fire, Police, Navy, RAF & Army
  - Positive feedback from SMEs; experiments in progress
  - Unforeseen benefits: “soft issues” and training

Further information

- Website: http://www.hfidtc.com

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