Deriving Information Requirements from Responsibility Models

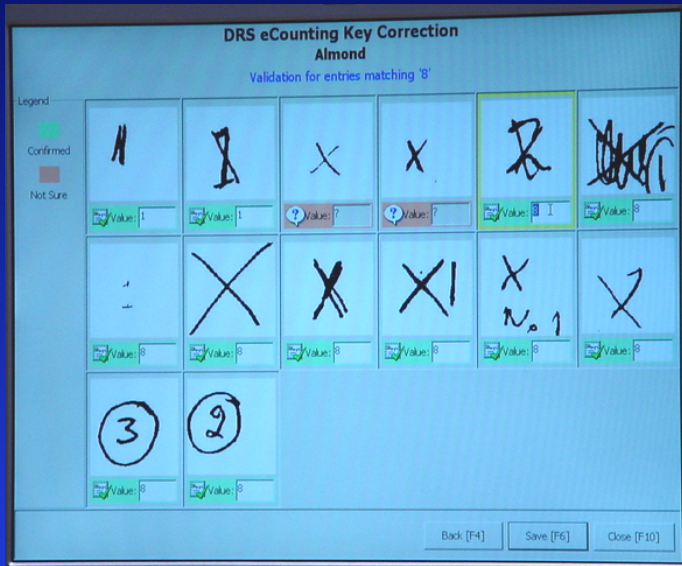Ian Sommerville, Russell Lock, Tim Storer and John E. Dobson

Enterprise Systems Requirements

- Trend in large scale systems procurement towards COTS/ERP platforms

- Functional behaviour of the system constrained by:

  - Design decisions and usage assumptions of underlying platform

  - The need to integrate with existing systems

- Requirements engineering also needs to capture a system's organisational and social context

  - Organisation and system will need to adapt to each other

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E-elections

Information Requirements

- After procurement, requirements engineering methods needed to identify:

    - The information to be held by the system

    - The agents who need information from the system

    - The agents who produce information for the system

    - Required degree of flexibility in information access

    - Consequences of incorrect information flow, deviations

- Influences:

    - platform configuration

    - organisational change, system integration

- Requirements are 'debated and negotiated'

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Responsibility

- A suitable abstraction for modelling the components and interactions of socio-technical systems of systems

  "A duty, held by some agent, to achieve, maintain or avoid some given state, subject to conformance with organisational, social and cultural norms."

- More abstract than goals or tasks (but…)

- Not (too) concerned with different types of agents

- Easier to express less formalised types of work

- Easier to discuss with stakeholders

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Slide 5

Responsibility as an Abstraction

Responsibilities — "Financial Management"

Goals — Improve Profitability by 5% over FY
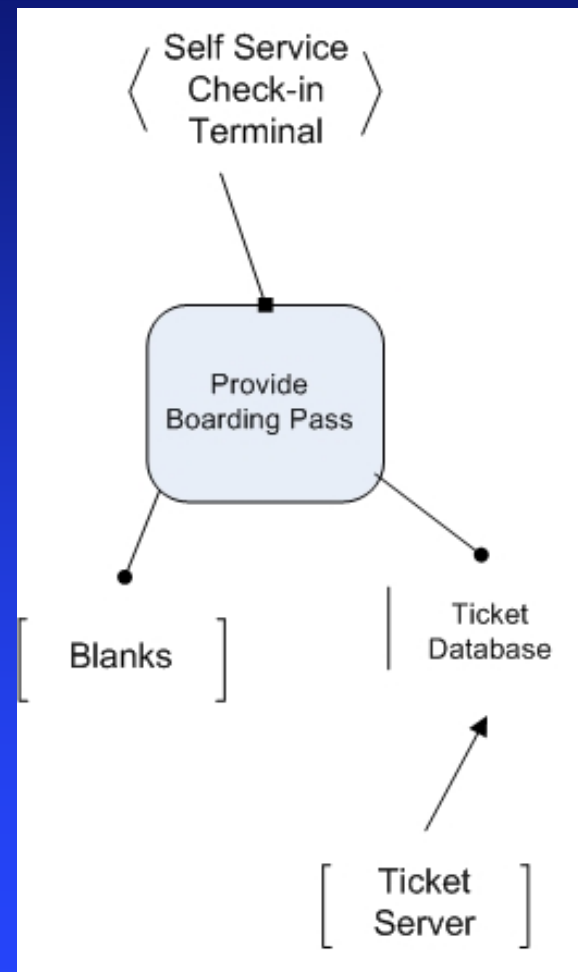
Tasks

Activities

Functions

...

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Modelling Responsibility

A simple graphical notation to capture:

- The agents in an ST-system
  - Police officer, secretary, server, boarding pass terminal...

- The responsibilities they hold, share, discharge...
  - Provide boarding pass, evacuate street...

- The resources required or provided by agents
  - databases, radio channel...

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Capturing Responsibilities

- Document analysis:

  - Business plans

  - Contingency plans

  - Process descriptions

  - System manuals

- Stakeholder interviews – responsibilities are a natural focus of discussion

- Field observations. e.g. ethnographic studies of work settings; how responsibilities may be delegated, transferred and shared.

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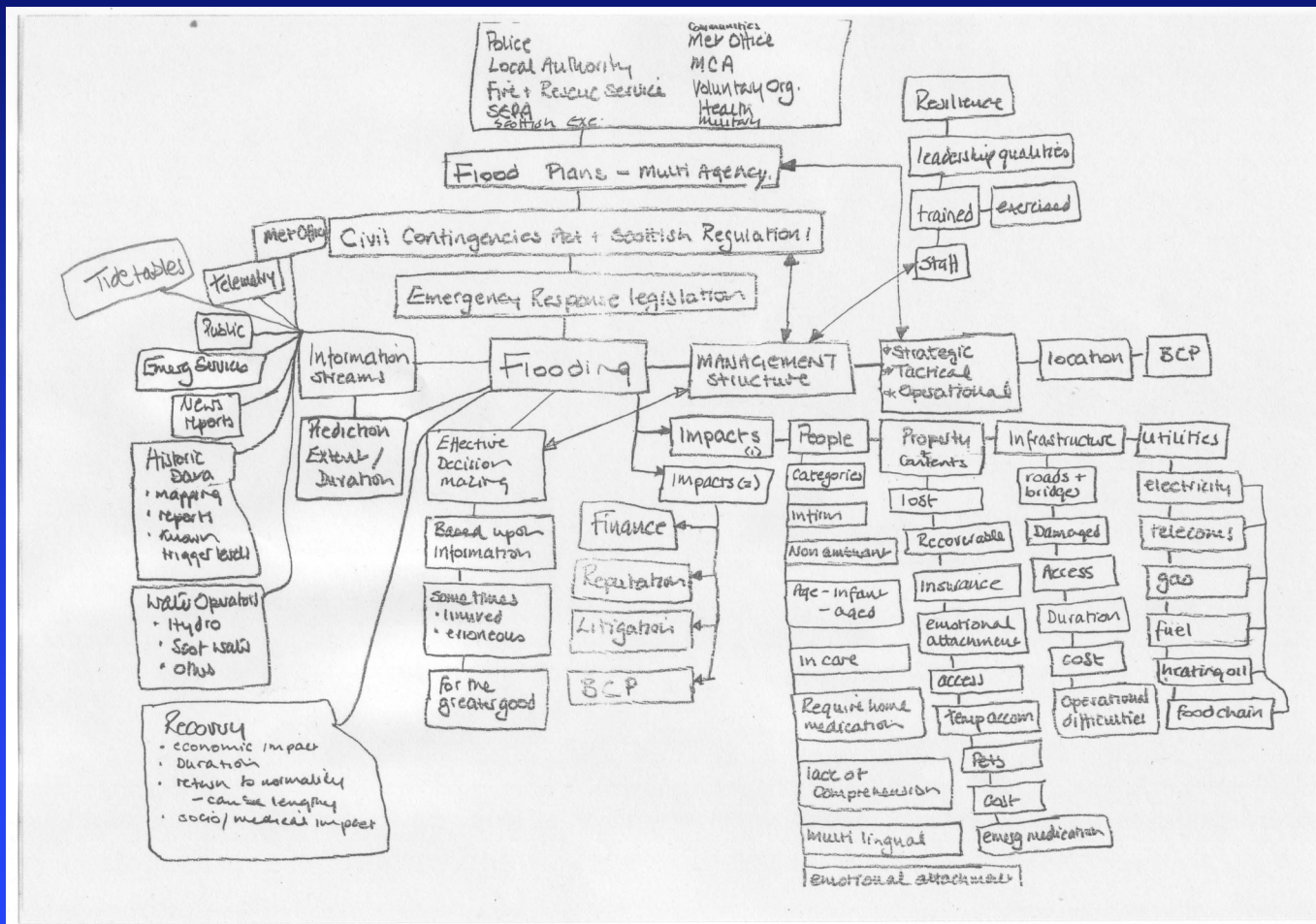www.indeedproject.ac.uk

Emergency Response Coordination

- Carlisle (North West England) suffered extensive flooding from 7th January 2005 due to heavy rainfall and debris blocking drainage channels

- The emergency response was based on prepared contingency plans

  - And appropriate adaptations as circumstances changed

- *Case study examines requirements for a (hypothetical) enterprise system for coordinating information between agencies in a control centre*

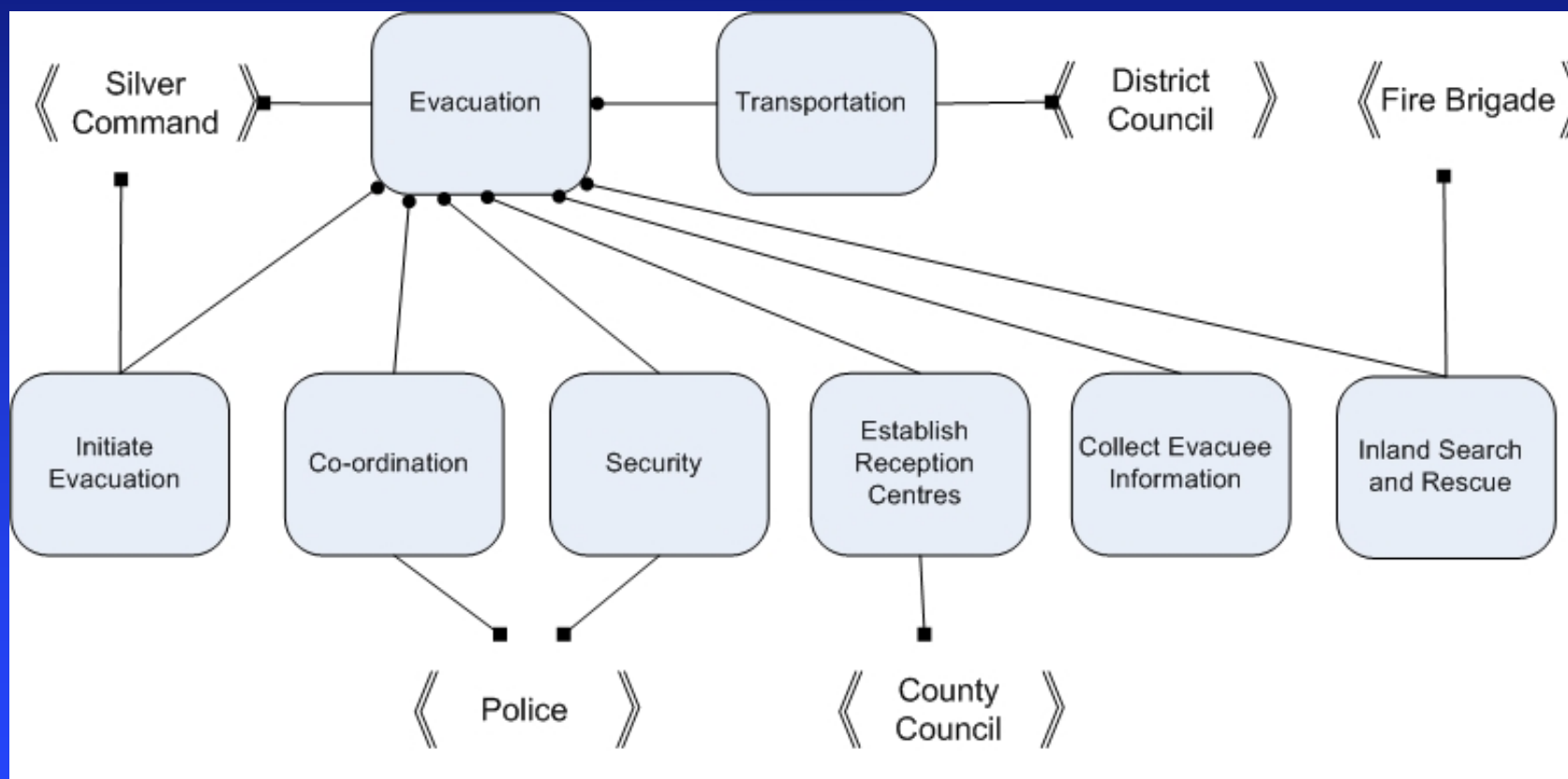 - Based on analysis of contingency plans and review report

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Some of the Complexity

Model: Evacuation

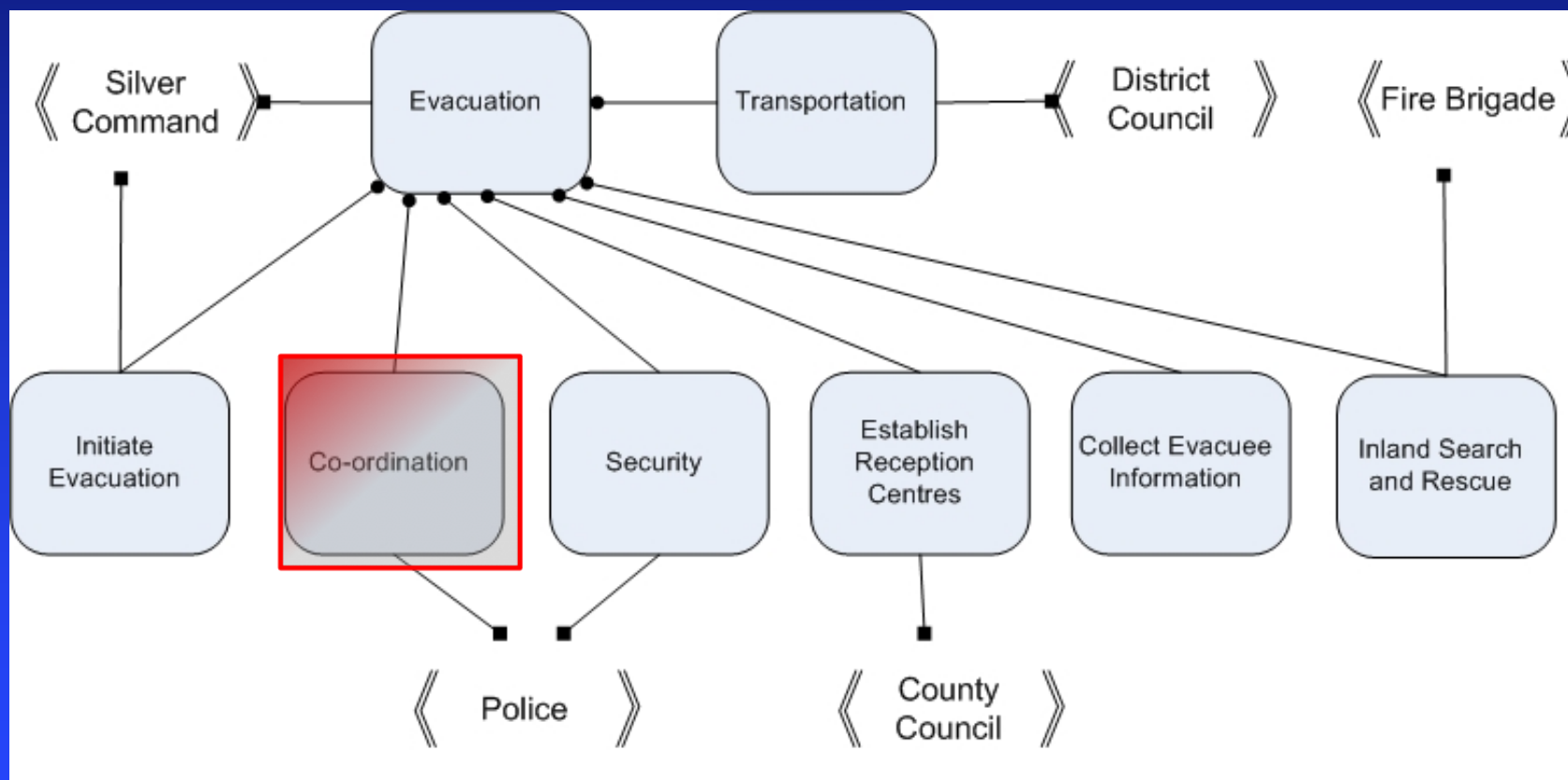- Focus on the responsibility to evacuate from flooded areas:

Information Resources

- What information is required to discharge this responsibility?

    – What channels are used to communicate this information?

    – Where does this information come from?

- What information is recorded in the discharge of this responsibility and why?

    – What channels are used to communicate this recorded information?

- What are the consequences if the information required is unavailable, inaccurate, incomplete, late, early?

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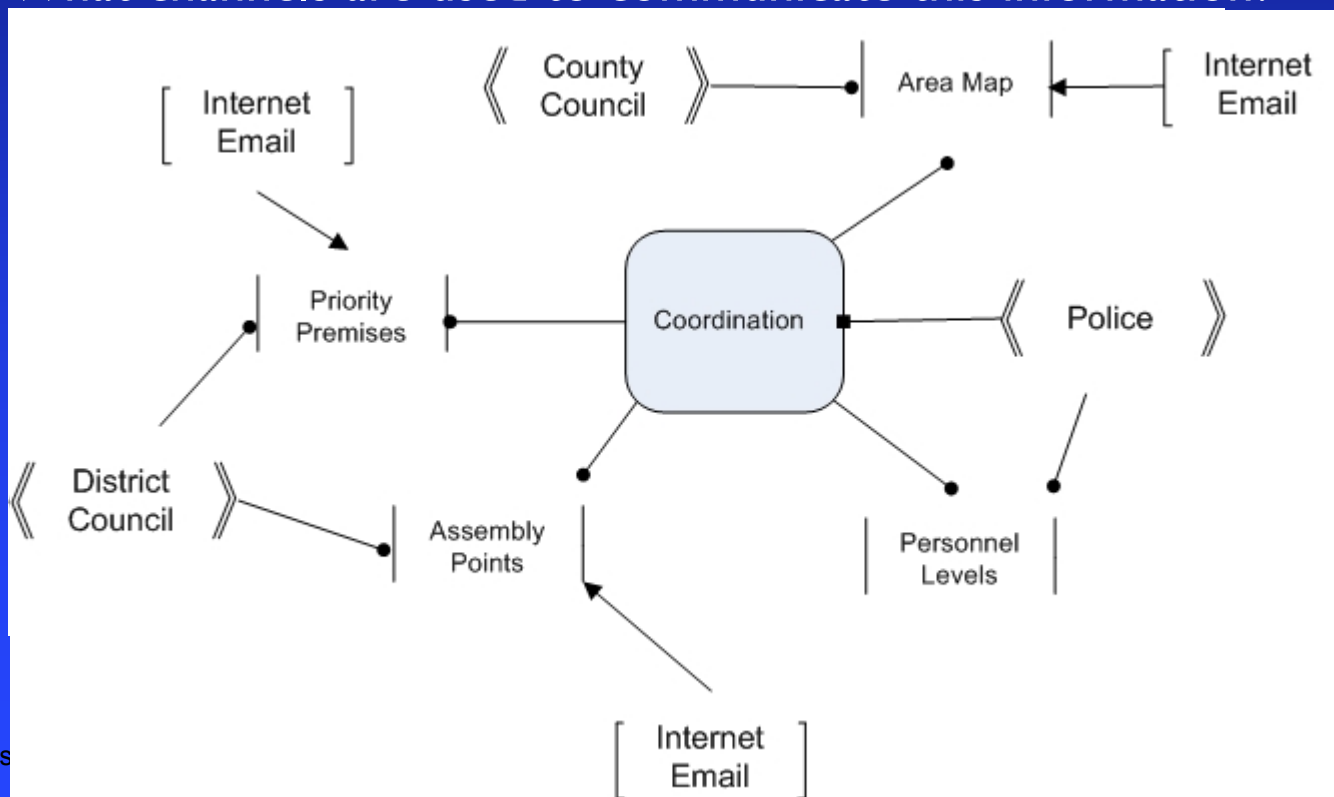Slide 12

Model: Evacuation

- Focus on the responsibility to evacuate from flooded areas:
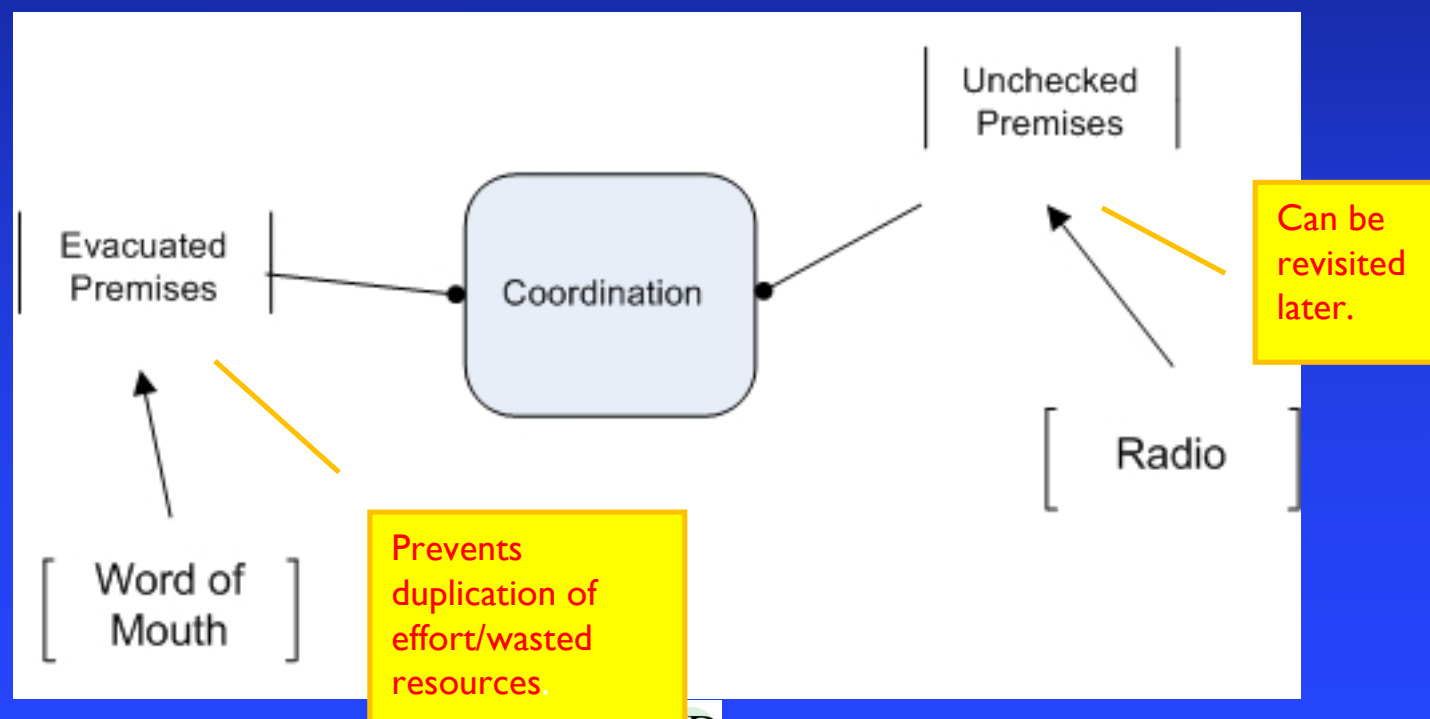
Required Information

- What information is required to discharge this responsibility?

  – Where does this information come from?

  – What channels are used to communicate this information?

Produced Information

- What information is recorded in the discharge of this responsibility and why?

  – What channels are used to communicate this recorded information?

Deviations

- HAZOPS style keyword/consequence method for assessing each information resource:

- Example: <u>Priority Premises Resource</u>

  - <u>Unavailable</u>: Manual premises check required to see if vulnerable people to be evacuated.

  - <u>Inaccurate</u>: Manual premises check may be necessary. Possible delay in evacuation of vulnerable people. People may be left behind.

  - <u>Incomplete</u>: Possible delay in evacuation.

  - <u>Late</u>: Information has to be communicated to units in the field rather than at local coordination centre.

  - <u>Early</u>: No consequence.

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Requirements Examples

- *The coordination system shall maintain a list of priority premises to be evacuated for each town in the local area.*

    – This shall be updated by the local council when the coordination centre is established. (The premises list is maintained by the local government authority but may not be immediately available outside of normal working hours; While a central list may be out of date, it is better than nothing.)

- *The coordination centre system shall maintain a list of premises evacuated along with the time of evacuation and the units involved in the evacuation.*

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Evaluation

An (informal) qualitative evaluation of the method. Factors to consider:

- Naturalness

  - Responsibility is a natural object of discussion regarding organisations and systems

- Scalability

  - Existing case studies are already sizable

- User involvement

  - Several organisations interested in the modelling approach

- Complementarity

  - Fit with existing conceptual frameworks, e.g. goals, tasks

  - Early stage RE

Summary

- The uptake of ERP/COTS systems means that requirements engineering can/must focus separately on:
  - Functional behaviour (procurement)
  - Information requirements (deployment)

- Responsibility modelling provides a basis for identifying, modelling and discussing I-requirements

- Future work:
  - Several larger case studies e.g. e-counting 2011, + suggestions
  - Incorporating deviation analysis into modelling notation
  - Simulation?

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