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Reflecting on the pedagogic benefits of an assessed class-room based professional complex emergency simulation: Responding to fire and other hazards in an industrial urban setting under (time / assessment) pressure

Simon Griffiths and Richard Kotter

Department of Geography and Environmental Sciences

Northumbria University, Newcastle upon Tyne, UK

MSc Disaster Management and Sustainable Development Integrated Emergency Management module

Module Learning Outcomes (MLOs) – which feed into/cover partially the Programme Learning Outcomes (PLOs)

Knowledge & Understanding:

- MLO1: Evaluate the effectiveness of approaches to integrated emergency management
- MLO2: Employ structured risk based methodologies to define the potential impacts from emergencies.

Intellectual / Professional skills & abilities:

- MLO3: Identify and evaluate limitations in delivering resilience despite integrated management approaches being applied
- MLO4: Critically review the methods for resilience building through anticipation and planning based on local, national and/or international drivers.

Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):

- MLO5: Evaluate how integrated emergency management is applied to all populations in an equitable manner in accordance with human rights.

Formative (assessment) task

- **Purpose:**

- to have groups plan a response to an incident in the classroom
- present to the whole class with justification for what they think is important, etc.

- **Context:**

- early phase of the response with limited information available

- **Outturn:**

- Student frustration at not being able to answer the question just like the initial phase of an incident, planned for, or not...
- Underpins the Integrated Emergency Management process

Purpose of summative assessment

- Application of knowledge in a non-linear fashion to respond to an **authentic** setting for major incident response management
- **Authentic learning**
 - *‘Authentic learning typically focuses on **real-world, complex** problems and their **solutions**, using **role-playing exercises, problem-based activities**, case studies, and participation in virtual communities of practice’* (Lombardi, 2007)



Contextualised with images from live play exercises, videos from real incidents, etc. we've been involved in

The summative assessment

- Responding to an unseen desktop exercise
 - Big Bang event
 - By several IEM teams (groups) – Fire & Rescue Service, City Council, private company [could be any organisation that is not the specialist public sector or local authority]
- More concerned with demonstrating thought processes in responding to an incident
 - Adaptability tested.
 - Group (and inter-group) working dynamics.
 - Time pressures (becoming more severe along the evolving incident).

You and your role



- In your group, you are (collectively) working for a City Council, in addition to your environmental health role, you are the responsible officer for emergency planning.
- You are the senior manager in the office meaning that any acute environmental and health protection incidents are referred to you and you take the lead in undertaking the environmental public health risk assessment on behalf of the Council.
- As part of the [Civil Contingencies Act 2004](#) and the generic emergency plan, your role is to advise other agencies and your Chief Executive as to how to respond alongside the emergency planning team.

You and your role

- In your group, you are (collectively) an Emergency Manager working for the Fire Service, a City Council, and a Private company respectively. You are the responsible officer for emergency planning.
- You are the senior emergency planning manager in the office meaning that any acute emergency incidents are referred to you and you take the lead in undertaking the risk assessment on behalf of your organisation.
- As part of the [Civil Contingencies Act 2004](#) and your organisation's generic emergency plan, your role is to advise other agencies and your Chief Executive as to how to respond alongside the emergency planning team.

The summative assessment

- Desktop exercise:
 - Builds with inputs at **undisclosed time intervals**.
 - Unknowns, just like a real response.
 - Uncontrolled open fire – public health threat from products of combustion, potential spread, disruption to infrastructure, etc.
 - Complicated by asbestos loss from structure and spillages of chemicals during evacuation, food model affected
- We are primarily assessing **thought processes in application** over recall
 - Adaptability.
 - Group working (including inter-group) dynamics.
 - Time pressures (becoming more severe along as the incident as evolving).

Inject 1: A “Big Bang” incident

It's 1341 on a sunny Tuesday in late July, a fire is reported by members of the public. They call 999 and ask for the Fire Service.

The location is given as a factory on the Byker Industrial Estate of Newcastle upon Tyne.

The cascade between the emergency services triggers a notification to the Council's Civil Contingencies team and is passed to you to assist in the response. It is now 14:10.

You are told that (a) a fire has been reported at Disk4U, a CD/DVD manufacturer, (b) fire and ambulance services are in attendance, (c) no casualties are currently reported.



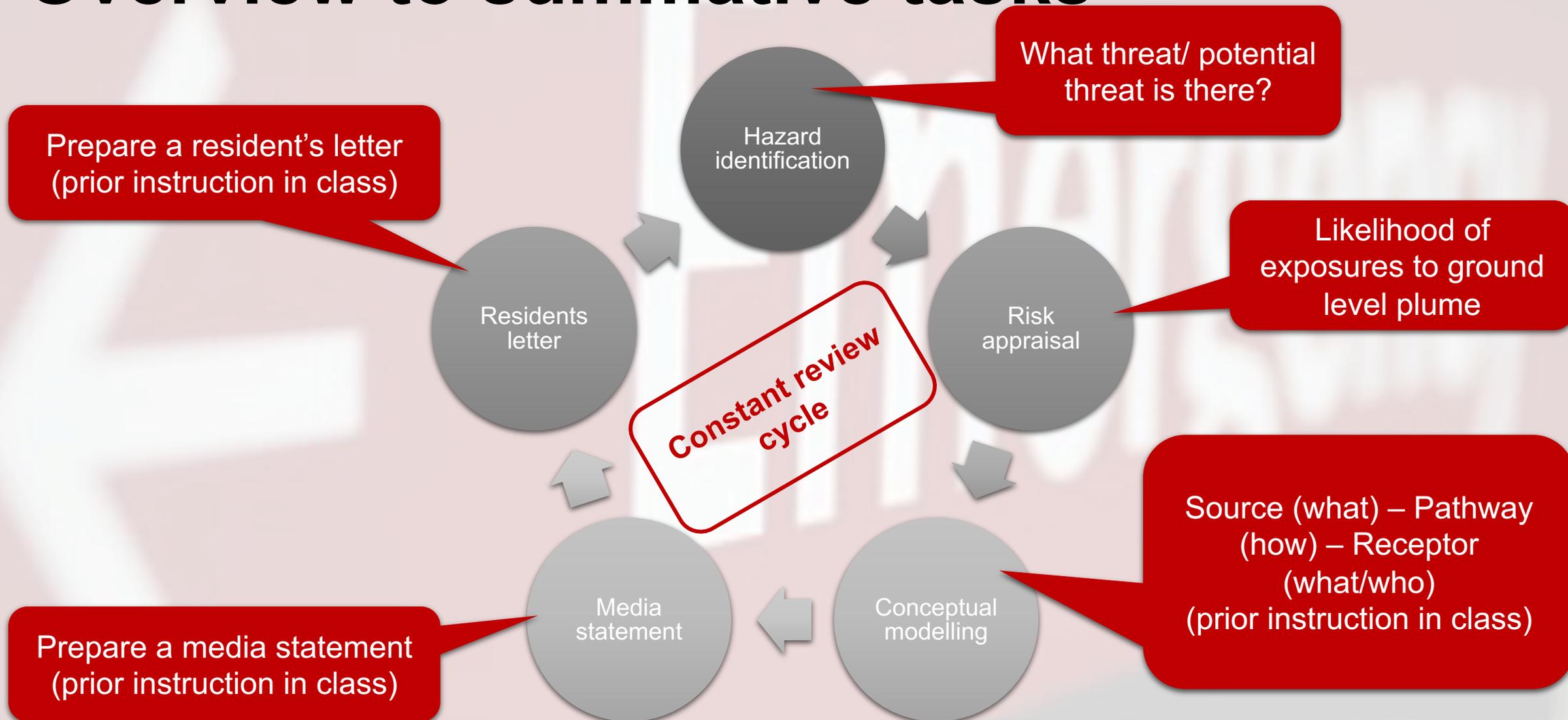
Inject 2a: Incident developing: @1432

The fire service have declared this a major incident and have 5 pumps ('fire engines') on the scene.

A large plume has been produced which is visible across the east of the city. It is heading across a light rail line and then out beyond the city itself towards cultivated farm land.

The Police have called a tactical (or 'silver meeting') to be held at Police HQ.

Overview to summative tasks



What's the hazard? What are (current) aggravating factors?

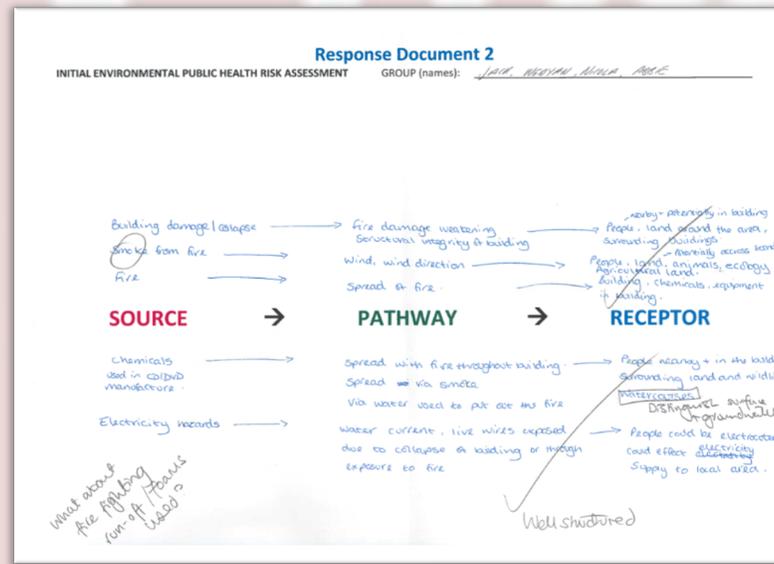
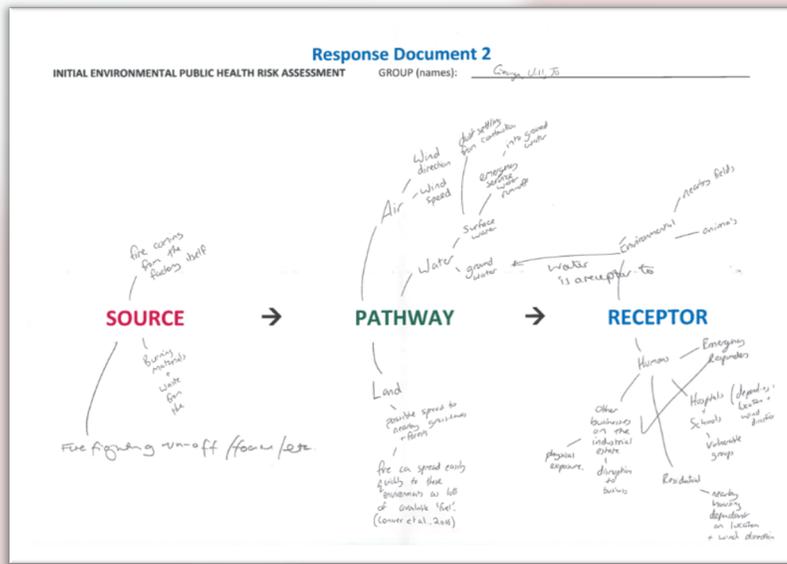
- Alongside injects, specific tasks are required

- E.g.

- Hazard identification + factors thought to aggravate situation
- Application of a pathway conceptual model*



Continuous feedback loop: Have your decisions changed with each new inject? Should they? Students / Teams challenged to review each time.



Jack, Nicola, Abbie, Weyan.
Response Document 1
List the hazards and identify any aggravating factors

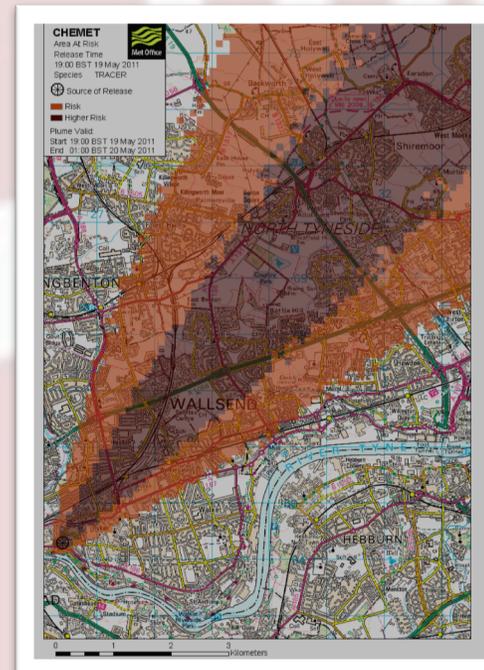
Hazard Identification	Aggravating factors
• Fire Increase in particulate matter. Smoke (air pollution) Products of smoke inhalation combustion	- Chemicals - Wind would aggravate smoke, wind direction.
• Building is damaged by fire (integrity)	- Fire damage, may affect structural integrity. Not really an aggravating factor
• Collapse of building, depending on damage	- Chemicals with aggravate the fire. - Flammability → chemicals - Sources of ignition around the proximity and on the premises.
• Chemicals from LD's/DVBs burning - Chemicals from materials used to make CO's/PUB	- aggravated from water used to put fire out
• Close proximity to other industrial buildings.	- What about materials comprising the building? " " time of day season? It's late July around lunchtime so people out in summer weather if perhaps schools closed?
• Electrical Hazards	

*Described originally by Holdgate (1979) but adaptable to a range of uses, e.g. Narayan, et al (2012), Davies, (2017) and Waldschläger, et al (2020)

Risk assessment and scaling the event

- Defining the student's perception of risk:
 - Key is *justification*
 - *Why* is the group thinking the way it is?
 - *Is* the risk score justifiable?

- Includes real world materials
 - CHEMETs
 - Material Safety Data Sheets (MSDS) for specific chemicals



Jack, Nicola, Wedyan, ADIC

Response Document 3

Using your table of hazards (response document 1), identify the risk score (likelihood x impact) for each and justify your reasoning on the table below.

Hazard (response document 1)	Risk score (above)	Justification
Fire	25	Due to the spread that could occur, structural integrity of the building, severe harm could be done through smoke inhalation, fire from etc.
Smoke (air pollution, inhalation)	25	Smoke will be kept in the building, surrounding areas are nearby, inhalation from steam effects of the smoke remain particulate matter could be inhaled.
Chemicals on the premises	25	Flammability of the chemicals, inhalation of the chemicals through equipment the fire will increase in smoke, particulate matter increase.
Building structure	25	Buildings can be within the building and will be killed, injured or burnt when the within the building and will be killed.

Response Document 3

Using your table of hazards (response document 1), identify the risk score (likelihood x impact) for each and justify your reasoning on the table below.

Hazard (response document 1)	Risk score (above)	Justification
Further sources of ignition (industrial estates)	25	Business like that likely to have further hot objects for electrical and gases.
Combustion fumes + dust	20	Very likely to be inhaled by those working with equipment and machinery attached to them.
Other hazards - burning CO2 plants	20	likely for fumes to come out the pipes and impact those in or nearby.

Multi-agency response: interoperability/interactivity

- Identify the synergies available to deliver a comprehensive response
 - What do the respective groups need to know (including from each other)?
 - Who (which organisation / team / source) can provide the information/response?

- Two approaches taken:
 1. Groups are assigned a specific agency with a clear agenda, and the groups interact internally and with each other across the classroom; or
 2. Groups are managing everything and identify who can help them to tackle the hazards identified and so manage the incident as it evolves.

George, Will, Jo

Response Document 5

Overall management of the incident: identify impact, action needed, agency involved

Impact (hazard)	Action	Agency to act
Disruption to Transport Links	Close off major Metro bus within the plane area of the CHEMET. If with flight path possible action needed (diverts path)	Local Authority cooperating with private companies (Newcastle Transport) <i>Key locally: Newcastle Road</i>
Impacts on local hospitals - dust in through ventilation units, through windows	Stay indoors, keep windows/doors shut, litter out for further alerts from media	Local Authority, PHE + NHS all involved with planning + communication.
Impact on residential processes allotments within their area	" - provide info to risk assess food grown during/after incident	" Local Authority PHE
needing schools in parking	" - provide closure to schools	" Local Authority, <i>Probably closed as late July.</i>
Public coming nearby to see to see what's going on + taking photos	Create a significant perimeter around the fire/plane and ensure those going to create scene	Police, Local Authority <i>as Highways Authority</i>
Farmstead contamination from dust + particles	Keep them informed potentially bring in livestock + their loads after plane has been dealt with	Local Authority, PHE? <i>FSA? DEFRA?</i>
Fire spreading to other industrial units	Try isolate the fire and put it out to prevent it spread to other nearby units	Fire service
Damage to local businesses and economy	Keep them up to date with info advice to ensure them to resume trading at earliest time	Local Authority <i>NO</i>

The student response to our approach

- **Prior to the exercise**

- Not knowing much about the incident can cause a *little* worry
- Supportive environment for students' worries

- **During the exercise**

- Students are focussed on their tasks
- Good group debate(s)
- Live research is undertaken – access to IT in the room

The student response to our approach

- **After the exercise**

- Positive feedback
- Enjoyed the challenge
- Pre-exercise reservations about the assessment disappear when they get on with the response: focus
- Recognise that they 'survived' through the ordeal
- Tired from the concentration, just like an authentic response ...

- Fun?!



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Question(s)

Thank you for your attention – any questions?

Please now, or afterwards by e-mail:

simon.griffiths@northumbria.ac.uk

richard.kotter@northumbria.ac.uk

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