

# Chaotic Fire Rescue

## A Major New Research and Development Project

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## Agenda

1. Context of the project
2. Introduce the parties
3. Introduce the 'Challenge'
4. CGIS
  - i. Tools
  - ii. Data
  - iii. The human factor
5. Conclusions

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## Background to the project

1. Bottom line: saving lives and preventing injury.
2. Client: Merseyside Fire and Rescue Service:
  1. Allocating resources to respond to an emergency.
  2. Modelling to allocate resources – getting it right!
  3. Linear modelling – the conventional approach.
3. House fires unexpected occurrences.
4. Need for more accurate models.

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## The Research and Development Team

1. The North-West GIS Research Laboratory,  
School of Computing and Mathematical Sciences,  
Liverpool John Moores University.
2. Merseyside Fire and Rescue Services.

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## The Challenge

1. Identifying where house fires may occur in the region.
2. Prediction of future house fires (and particularly out-of-context house fires that appear as random events now that we do not expect).
3. Ensuring that resources are:
  1. where they are likely to be needed,
  2. when they are likely to be needed and,
  3. in the right quantity that may be needed.
4. Value for money!
5. Preventing possible death and injury.

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## The problems

Current modelling approaches:

1. Assume linearity – what happens today, given the same variables will happen in the future.
2. Can't identify who will be affected.
3. Lack of data – or data is underutilised.
4. Mostly paper map/attribute records.
5. Knowledge rests with individuals - Lost if they leave.
6. Need to improve resource allocation models to ensure:
  1. Saving lives and preventing injuries.
  2. Obligation to achieve value for money.

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## Objectives of the project

1. Enable FRPT to forecast potential house fires.
2. Ensuring that this project has the potential to impact positively on current approaches to planning fire and rescue service response to house fires.
3. Improve resource allocation and reduce overheads whilst increasing prevention of death and injury from house fires.
4. Provide a more flexible and responsive planning model that can be commercialised.
5. Provide potential to integrate with other Fire and Rescue Services both in the UK and internationally.
6. Enable improvements to be made in fire response planning.

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## Expected benefits of the project

1. Less fatalities, injuries and damage.
2. Greater efficiency.
3. Effective management of fire and rescue resources.
4. Improved service to the community.
5. Ability to learn from the planning process to improve the planning process in the future.

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## What is the project?

1. Fire and Rescue Planning Tool (FRPT).
  1. A completely newly designed web-based Geographical Information System.
  2. Completely new models that forecast likely occurrences of house fires and their possible future impact.
2. An improved set of digital data that, as far as possible, accurately models the region.
3. The design and development of a software application that operates via the World Wide Web that integrates the elements described above.

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## Feeding the beast – base data

1. Re-examination of existing data
2. Improving base data
3. Augmenting the way we interpret existing data
4. Brief example of Chaos Modelling: earthquake data in Turkey and impact of earthquakes on human settlements: the development of a whole new methodology!

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## Initial Analysis of Merseyside Data

1. Legacy data on dwelling fires spanning over 10 years has been collected from the Merseyside Fire & Rescue Service
2. Data reveals “people factor” as the common underlying cause of dwelling fires
3. All victims died in their homes, with elderly people being the most vulnerable
4. Majority of dwelling fires occurred in
  1. Terraced Houses (5)
  2. Semi-detached houses (1)
  3. Flats/multi-occupied houses (3)

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## Our Approach to a New Methodology

1. Identify potential causal factors that shape the right environment for dwelling fires
2. Consider every possible variable – No data is useless for now!
3. Apply Principal Component Analysis (PCA), a component of Chaos Modelling, to reveal main attractors by reducing multi-dimensional datasets to lower dimensions
4. Identify variable combinations with highest potential to cause dwelling fire

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## Developing the Beast: Web-based GIS Tools

1. Outcome: A state-of-the-art WWW-based GIS with Modelling opportunities to predict future house fires (and random / out-of-context house fires that we do not expect).
2. Project team supervised by senior academics with extensive technical development experience.
3. 12-month project with clearly defined key stages.

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## Further application - outside

1. Sharing between services both inside the UK and in other countries.
2. Commercialisation.

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## Resourcing the project

<b>Team Leader</b>	Dr. Michael Francis
<b>Project Manager</b>	Hülya Francis
<b>Software Developer</b>	Mr. Joseph Iregbu
<b>Content Supervisor</b>	Dr. Mark Taylor
<b>Model Developer</b>	Miss Basak Vurguncu

<b>Start:</b> September 2007	<b>End:</b> August 2008
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## Conclusions

1. FRPT will provide more accurate and readily accessible information which should help improve service to the community by:
  - a. Accurately forecasting likely occurrences of house fires;
  - b. Reducing irrelevant forecasts;
  - c. Avoiding proposing resource allocation with a low chance of success;
  - d. Reducing time required to interpret and check forecasts of likely house fires;
  - e. Improving the efficiency of preventive work.

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## Conclusions cont'd

1. Using Chaos Modelling improves the chances of success.
2. Having digital data enhances the process and opens up new possibilities:
  - i. Makes the process better able to respond to change
  - ii. Make planners and command and control management better informed
  - iii. Reduce loss of information/experience
  - iv. Accumulate valuable data on possible house fires
  - v. Potential to integrate with other services.

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Thank you for your time

I will be pleased to answer any questions.

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