

Institution: Liverpool John Moores University (LJMU)		
Unit of Assessment: UOA11 – Computer Science and Informatics		
Title of case study: Fire Prevention and Community Safety		
Period when the underpinning research was undertaken: 2010-2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr M. Taylor	Senior Lecturer	1992 to present
Mrs H. Francis	Senior Lecturer	2002 to present
Prof P. Lisboa	Professor	1996 to present
Dr I. Jarman	Senior Lecturer	2011 to present
Period when the claimed impact occurred: August 2013 to July 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>This case study concerns novel informatics modelling of at-risk groups in terms of combined fire, health, social, and crime risk, enabling more accurate targeting of fire prevention. The impact of the research has been the adoption of the approach as a form of best practice [A] to improve targeting of fire prevention, and a contributing factor to significant reductions in accidental dwelling fires of 25% (283 incidents), and accidental dwelling fire injuries of 31% (39 injuries) across Merseyside between 2013 and 2020, resulting in a saving of £877,300 (responding to a fire is estimated at £3,100 per incident).</p>		
2. Underpinning research <p>UK Accidental dwelling fires are costly both in economic and social terms. UK preventative health and social care measures such as smoking cessation, alcohol management, bowel cancer screening and elderly falls are proven to be effective both in economic and social terms to the NHS and local councils. However, it can be difficult to gain access to individuals to promote preventative measures. The research aims and objectives were to identify at-risk community groups in Merseyside to enable active inter-agency collaboration between fire and rescue, health, social care and police services, thus improving NHS and social services access to residents via fire and rescue services, and addressing causal factors associated with dwelling fires via NHS and social services.</p> <p>The novel research into accidental dwelling fire risk and community safety incorporated associated risk factors within health care, social care and crime as a basis for detailed analysis of fire risk causal factors amongst different at risk social groups. An innovative customer segmentation model was developed by Lisboa, Taylor, Jarman, and Francis between 2010 and 2013 to provide analyses of at-risk social groups in terms of combined fire, health, social care and crime risk [1, 2, 3, 4, 5]. This involved data modelling using data from numerous external agencies including the Department for Work and Pensions, the Office for National Statistics, and the NHS. The theoretical challenge of the research was to identify social groups and individuals considered at-risk by a number of public sector agencies, resulting in a set of detailed community profiles.</p> <p>The novelty of the research was a customer segmentation approach that identified combined fire, health, social care and crime risks to produce a set of community profiles [5]. The key findings from the research were the significant differences in fire risk levels across different community profiles. This research provided innovative customer insight for the partner public sector agencies</p>		

to work collaboratively by signposting individuals and households to relevant partner agencies [1, 2, 3, 4, 5] as part of a multi-agency preventative approach. This included referrals to NHS smoking cessation and alcohol management services, and referrals to the local council for housing and social care issues [5, 6]. The modelling enabled differences in terms of the risk of fire-related injuries and fatalities between the population segments to be examined [5]. The community profiles were used to target areas of greater risk of particular types of fires (e.g. kitchen fires). Over 80 percent of kitchen fires occurred within three of the ten community profile groups: students; young families with high benefit need; younger, urban population living in high levels of deprivation. The student group in particular was targeted via a specific Merseyside Fire and Rescue Service (MFRS) website section and Facebook videos. The significance and impact of the research is the ability to identify and target at-risk groups of joint interest to fire and rescue, health, social care and police services in order to support further fire incidence reduction.

The research was funded by the UK Department for Communities and Local Government (2010 – 2012) (Grant awarded to Lisboa, Taylor, and Jarman) [7] and Merseyside Fire and Rescue Service (MFRS) (2012 – 2013) (Grant awarded to Lisboa, Taylor, and Jarman) [8]. The grants involved MFRS, Wirral Council, Wirral NHS PCT and Merseyside Police.

3. References to the research

- [1] Higgins, E., Taylor, M., Jones, M., Lisboa, P. J. G. (2013) Understanding Community Fire Risk – A spatial model for targeting fire prevention activities, *Fire Safety Journal*, 62, 20-29, ISSN 0379-7112
- [2] Higgins, E. Taylor, M., Francis, H., Jones, M., Appleton, D. (2014) The evolution of geographical information systems for fire prevention support, *Fire Safety Journal*, 69, 117-125, ISSN 0379-7112
- [3] Higgins, E., Taylor, M., Francis, H., Jones, M., Appleton, D. (2015) Transforming fire prevention: a case study, *Transforming government: policy, process and people*, 9, 2, 223 – 236, ISSN 1750-6166
- [4] Higgins, E., Taylor, M., Francis, H. (2015) A systemic approach to multi-agency community safety, *Systems Research and Behavioural Science*, 32, 344-357 ISSN 1099-1743
- [5] Taylor, M., Higgins, E., Lisboa, P., Jarman, I., Hussain, A. (2016) Community fire prevention via population segmentation modelling, *Community Development Journal*, 51, 2, 229-247, ISSN 0010-3802
- [6] Taylor, M., Appleton, D., Keen, G., Fielding, J. (2019) Assessing the effectiveness of fire prevention, *Public Money & Management*, 39, 6, 418 – 427, ISSN: 0954-0962

All the above publications have been through a rigorous double-blind peer-review process.

Key research grants and grant reports:

- [7] UK Department of Communities and Local Government (2010 - 2012) Customer led transformation programme. Grant awarded to P. Lisboa, M. Taylor and I. Jarman, Grant value £77,716 <https://www.local.gov.uk/sites/default/files/documents/merseyside-fire-and-rescu-bdc.pdf>
- [8] Merseyside Fire and Rescue Service contestable research funding for Customer Insight Project (2012-2013) Strategic Planning Department, MFRS Headquarters, Bridle Road, Bootle, Merseyside L30 4YD, Tel: 0151 296 4000. Grant awarded P. Lisboa, M. Taylor and I. Jarman, Grant value £44,000.

4. Details of the impact

The research resulted in two main areas of impact: fire safety and community safety. The fire safety impact concerned identifying and targeting vulnerable groups involved in accidental dwelling fires. This has increasingly involved concentrating on the most vulnerable social group, those aged 65+ [6], due to ongoing MFRS budget reductions [6]. The community safety impact concerned identifying vulnerable groups in terms of health and social care risk, and referrals to other agencies (NHS and local councils) to address health risks associated with smoking, alcohol consumption, bowel cancer and elderly falls [6]. The HM Inspectorate of Constabularies and Fire and Rescue Services inspection in 2018-2019 rated MFRS as outstanding in preventing fires and other risks, and commented that 'The service has moved from offering universal home fire safety visits to concentrating on those at the highest risk from fire, based on robust research into the causes of fire deaths in Merseyside over the past decade'. The Chief Fire Officer for MFRS commented that: 'The modelling has undoubtedly contributed to a significant reduction in accidental fires helping to make Merseyside a safer place'.

Fire safety

In terms of fire safety, the key areas of impact resulting from the research were reduced economic and social costs of fire, and improved service provision. The research provided a deeper understanding of the effectiveness of current fire prevention activities [6]. Between 2013 and 2020, there was a reduction in accidental dwelling fires of 25% (283 incidents), and a reduction in associated injuries of 31% (39 injuries) across Merseyside. In Merseyside in 2019/2020 there were 870 dwelling fire incidents and 87 fire injuries. This reduction in accidental dwelling fires and injuries is associated with improved targeting of fire prevention activities resulting from the research. The community profiling enabled more accurate identification of vulnerable groups and individuals, for example, the customer segmentation model found that those aged 65+ were proportionately more likely to be injured or die in a dwelling fire than those aged less than 65 [6]. As a result of the research, more targeted home fire safety checks have resulted in fewer house fires (down 25% from 2013/2014 to 2019/2020), this has allowed MFRS to use resources more effectively. A key impact for MFRS of the research is that it has assisted in developing policies for adjusting to a reduced budget whilst maintaining a good level of service to the community [B].

The financial impact of the research was measured by the reduced cost of responding to accidental dwelling fires. Responding to a fire is estimated at £3,100 per incident, therefore reducing the number of incidents amounted to an estimated saving of £877,300 over the period 2013 to 2020 [C]. The research has also enhanced collaboration with other agencies for more accurate targeting of preventative measures to the most vulnerable communities. The approach has been promoted by the UK Department of Communities and Local Government as being of benefit for Fire & Rescue Services across the UK and beyond [A].

Community Safety

In terms of community safety, the key significant areas of impact resulting from the research were NHS savings from preventing falls and smoking cessation, and individuals being able to stay in their own homes. Referrals to other agencies as part of the enhanced fire prevention and community safety enabled by the research included: NHS smoking cessation, alcohol reduction, and bowel cancer screening referrals, and Local council social services Falls risk assessment

referrals. The community safety model supports preventative measures that can save considerable funds in the medium term for the different public sector agencies involved. The research found that the majority of residents visited had factors present that could result in them becoming at risk from fire, and were signposted or referred onto another agency because additional risks or needs were identified [A]. This evidences the value of more accurate targeting of fire prevention activities as part of a multi-agency preventative approach, by referring onto other agencies if additional risks are identified.

The Community Profiles developed by the research have been used by MFRS to develop new fire safety campaigns to better target Safe and Well visits based on known risk factors. This supports better targeting of fire risk, for example the concentration of fire prevention activities towards the elderly that represent the most at-risk group in Merseyside. This has improved operational efficiency and improved decision making.

5. Sources to corroborate the impact

- [A] UK Department of Communities and Local Government, *Customer led transformation programme Case study*: Merseyside Fire and Rescue Service 41/58
<https://www.local.gov.uk/sites/default/files/documents/merseyside-fire-and-rescu-bdc.pdf>
- [B] P. Garrigan, Chief Fire Officer, Merseyside Fire and Rescue Service, MFRS Headquarters, Bridle Road, Bootle, Merseyside L30 4YD, Tel: 0151 296 4000
- [C] G. Oakford, Area Manager Prevention, Merseyside Fire and Rescue Service, MFRS Headquarters, Bridle Road, Bootle, Merseyside L30 4YD, Tel: 0151 296 4000.
- [D] UK HMICFRS MFRS Inspection report 2018-19
<https://www.justiceinspectorates.gov.uk/hmicfrs/publications/frs-assessment-2018-19-merseyside/>