

Evaluation of the LAS
GoodSAM Project
London Ambulance Service

Version 2.1, 29th June 2016

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Summary

This report presents the findings of an evaluation of the integration of the GoodSAM responder mobile app into LAS's emergency dispatch system.

The GoodSAM responder app allows volunteer responders trained in CPR to be alerted to a potential cardiac arrest near them so that they can perform CPR before the arrival of paramedics. The integration with LAS's dispatch system allows alerts to be sent automatically to volunteer responders within 200m of an incident when a 999 call meets certain criteria.

The evaluation focused on the period from the launch of the integration in mid-July 2015 to the end of February 2016 and consisted of two elements. The first was a qualitative study of the experience of responding to an alert conducted through (a) a series of interviews with 13 responders who had attended 16 incidents between them; and (b) a survey with the remaining attending responders that was answered by six further responders. The second element was a quantitative analysis of the impact that the integration has had on bystander CPR rates, bystander defibrillator rates and survival outcomes.

There are three main findings relating to the overall impact of this initiative:

- **GoodSAM responders are getting involved:** out of the 22 incidents that they were alerted to, all but one of the responders interviewed and surveyed arrived successfully at the incident. GoodSAM responders helped with CPR or other basic first aid and assistance about half of the time. They also provided assistance when they were not first on scene, including administering CPR, showing that LAS paramedics are making effective use of their presence. In incidents where they did not give any assistance this was typically because a number of paramedics had already arrived and there was nothing more they could do.
- **High satisfaction among responders:** one of the strongest findings from the qualitative research was the strength of commitment to the project among the responders. It is notable that every responder interviewed or surveyed is still using the app and would respond again if alerted. A large majority of these responders also commented that they have become advocates for GoodSAM since responding, attempting to persuade other people they know who are appropriately trained to sign up too.
- **Inconclusive impact:** there were almost 6,000 incidents during the evaluation period that were initially assessed as being suitable for a GoodSAM responder. In about 300 (5%) of these incidents at least one potential responder was in range and was sent a notification.

It is still early days for this initiative—the number of responders in the system is growing all the time—and the small number of incidents responded to so far means that no firm conclusions can be drawn from the quantitative analysis of outcomes. The impact of the app and its integration with LAS dispatch systems will become clear when a higher proportion of incidents are attended by a GoodSAM volunteer.

As well as these findings on overall impact, we identified seven areas for improvement for the app and the integration:

- **Silent mode and acceptances:** around a third of interviewees had their phone on silent when the alert arrived. Almost 60% of alerts sent to the mobile phones of volunteers were classed as not seen — that is, the responder did not accept or reject the alert. This suggests that there may be a large number of alerts that are not seen by potential responders as their phone is on silent. Finding a way to break through silent mode could have a large beneficial impact on the rate of response to notifications.
- **Not looking for defibrillators:** most responders only looked around their location for nearby defibrillators when they first installed the app and did not check the map again for a defibrillator before responding to an alert, potentially missing any defibrillators that have been added since. Finding a way to remind responders to check for a nearby defibrillator before they respond to an alert could help solve this issue.
- **Driving and official identification:** the current base of volunteers for the app has a large proportion of experienced responders—LAS staff, Emergency Responders and Community First Responders—as opposed to first aiders. We found that these volunteers are highly likely to drive to incidents and take official identification such as a yellow LAS or CFR jacket, even though they are explicitly asked not to do either in the code of conduct that they sign up to as part of governance around the initiative. They are trained and habituated to respond in this way so need more help to remember not to than other types of volunteer responder.
- **Taking emotions into account:** Some responders—both those who attended incidents and those who were unable to accept an alert—spoke about the emotional side of the experience. A few responders who attended an incident, particularly the more inexperienced ones, felt a rush of emotions afterwards. Sometimes, this was from an adrenaline low after providing useful assistance on-scene, and sometimes from guilt or disappointment at not being able to be more helpful. For those who had to reject an alert, they sometimes felt guilty at having to do so. The app could do more in its feedback mechanisms and content to reassure its users.
- **Problems finding the location:** in a small number of incidents the marker showing the location of the incident was in a different location to the address. In these situations, responders expected to be able to use the app’s messaging functionality to clarify the

location of the incident. However, these messages are not sent through to control. The app should either help responders clarify the address in some way, or automatically show notifications of location updates from LAS to the responder.

- **Status and scheduling:** a couple of the less technically confident responders were unsure after installing the app if they needed to do anything to make themselves available to receive alerts. In addition to this, some responders wanted to be able to set themselves as unavailable at certain periods of time. If the app were to provide functionality to allow someone to set their availability with a clear visual indicator of this, this could potentially address both of these issues.
- **Gaining entry:** many responders used allusions to LAS—for example, “did someone call an ambulance?”—to gain entry to an incident. Responders should be given more guidance on what to say when arriving to ensure other people at the incident understand who they are.

A more detailed discussion of all these findings, their implications and recommendations can be found in the final section of this report.

It is worth bearing in mind that the volunteer responders alerted during the evaluation were members of a pilot group made up predominantly of people with clinical experience and an affiliation to LAS. In the longer term, it is expected that the majority of responders will be first aiders. As a result, the findings from this evaluation relating to the behaviour of responders are unlikely to be representative of future responder behaviour.

Overall, this has been a promising start for the integration of GoodSAM and LAS dispatch systems, and the two organisations have successfully combined forces to solve the many practical challenges involved in making this initiative work.

While the relatively small number of incidents means it is hard to make conclusive statements about the impact on outcomes, it is clear from the qualitative research that the app is successfully helping volunteer responders attend cardiac arrests near them, sometimes before a paramedic arrives, and delivering a satisfying experience for the responder that ensures they will continue to volunteer.

There are a few technological and process changes that could be made to improve the overall effectiveness of the initiative and to ensure that responders are acting as safely as possible. In the short term, LAS should focus on increasing the number of volunteer responders in the system to ensure that the initiative is given the opportunity to prove its impact.

2. Introduction

This report presents the findings of an evaluation of the integration of the GoodSAM responder mobile app into LAS's emergency dispatch system. This chapter briefly describes some of the background and aims of the GoodSAM responder mobile app and its integration with LAS systems, before setting out the objectives and methodology of the evaluation.

Background

LAS has been working in partnership with other organisations to increase the number of members of the public who have the skills to provide medical life support in emergency situations. However, there is still an element of chance involved in whether someone appropriately trained is on-hand when help is needed.

LAS's partnership with GoodSAM aims to reduce this element of luck by explicitly alerting trained volunteers—who almost certainly would not otherwise have realised that they could help—to a potential cardiac arrest near them so that they can volunteer to respond if they are available.

A trial integration with GoodSAM was launched in mid-July 2015 with only LAS staff and Community First Responders registered as responders, before slowly scaling up membership over the following months as the system proved itself and small issues were dealt with.

Responder Governance

LAS set up a number of means of communication and governance around new responders signing up for the system. This included:

- Every application to be a responder is checked to ensure that the applicant has adequate and up-to-date resuscitation skills before a registration is processed. The applicant needs to provide evidence in the form of a registration number or scan of the relevant certificate.
- The app includes a screen that contains the name and the registration details of the responder to act as ID that can be shown on arrival at an incident.
- LAS staff are reminded of the GoodSAM code of conduct they committed to when signing up. This is shown in the app and on the website and can be seen here: <https://www.goodsamapp.org/codeofconduct>.

- An FAQ was set up for LAS staff based on common questions that arose during the evaluation period..
- GoodSAM responders are only sent to incidents that match certain criteria called determinants. These determinants are clearly defined and limited so that the chance of sending a volunteer to an inappropriate or non-cardiac event are mitigated/limited. These determinants are reviewed regularly.

Objectives

This evaluation had two main objectives. Firstly to understand the experience of using the app to respond to an alert in order to improve it, and secondly to quantify any impact the integration of the app has had on bystander responding and survival outcomes.

More specifically, the evaluation had the following objectives:

- To identify ways to improve the experience of using the app for the volunteer responders.
- To identify potential changes to the app and integration to improve their overall effectiveness.
- To understand what impact the use of the app by LAS has had on bystander-initiated CPR and bystander use of defibrillators.
- To understand what impact the use of the app by LAS has had on survival to hospital admission and survival to hospital discharge.

Methodology

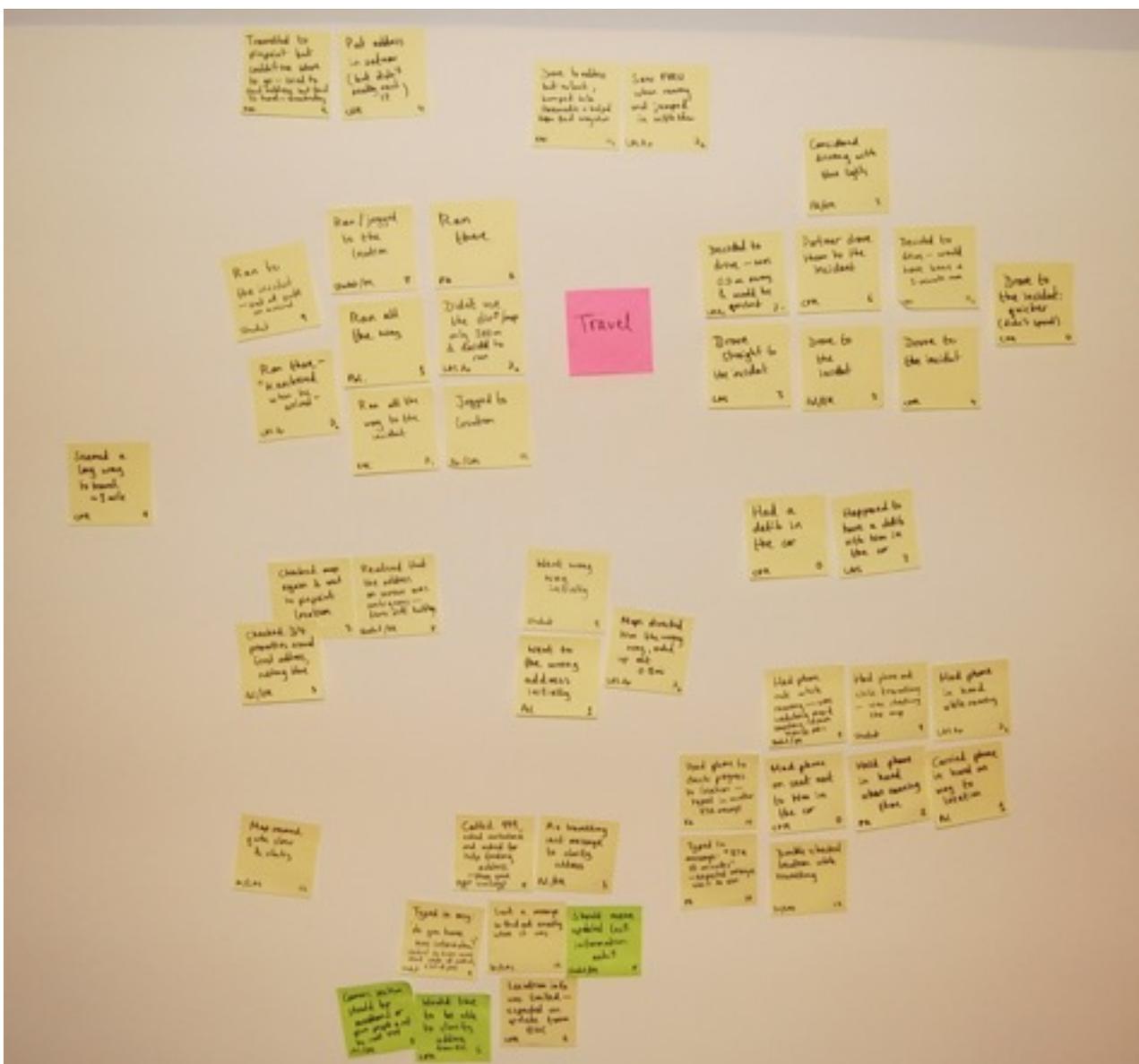
The evaluation focused on the period immediately after the launch of the integration on 15th July 2015 to the end of February 2016 (hereafter referred to as the evaluation period). The evaluation had three main activities:

- **Interviews:** a review of the experience of volunteer responders through a series of one-on-one interviews with a selection of responders who had attended an incident.
- **Quantitative analysis:** an analysis of the data on incidents that met the criteria for a GoodSAM responder to attend.
- **Survey:** a survey of other volunteer responders who were not interviewed to help triangulate the findings from the interviews.

The evaluation was running concurrently with the delivery of the project which meant that changes were happening while data was being collected. For example:

- The number of responders available to be alerted grew from 33 at the beginning of the evaluation period to 377 by the end.
- It was discovered mid-way through the interviews that the street address for an incident had been removed from the main screen of the GoodSAM app which was confusing for some responders. After sharing an initial round of feedback from the interviews, GoodSAM reinstated this on their next update.

The rest of this section describes each of the three activities outlined above in more detail.



Interviews

The purpose of the interviews was to explore in detail with individual responders their experience of responding to an incident through GoodSAM, the role of the app within this and how the experience could be improved.

Out of 32 responders who were initially contacted to be interviewed, 13 agreed to a one-on-one interview for up to an hour. Out of the total of 13, four were LAS staff, three were Community First Responders, 3 were first-aiders, two were Emergency Responders and one was a police officer.

Each interview was structured around the process of responding as described at the start of chapter three of this report. For each stage, participants were asked to describe what they were doing, what happened, what informed and motivated them to act in the way they did, and their use of the app.

The findings from the interviews were arrived at by coding up every observation from each interview according to the stage it was relevant to, the type of responder and the participant number. These were then written on post-it notes and grouped together to identify patterns. For example, the observations for the travel stage of the process are shown in the photo on the previous page.

These findings were then triangulated against the results from a qualitative survey conducted by another researcher as part of a postgraduate dissertation to identify any patterns or insights that were not uncovered by the interviews.

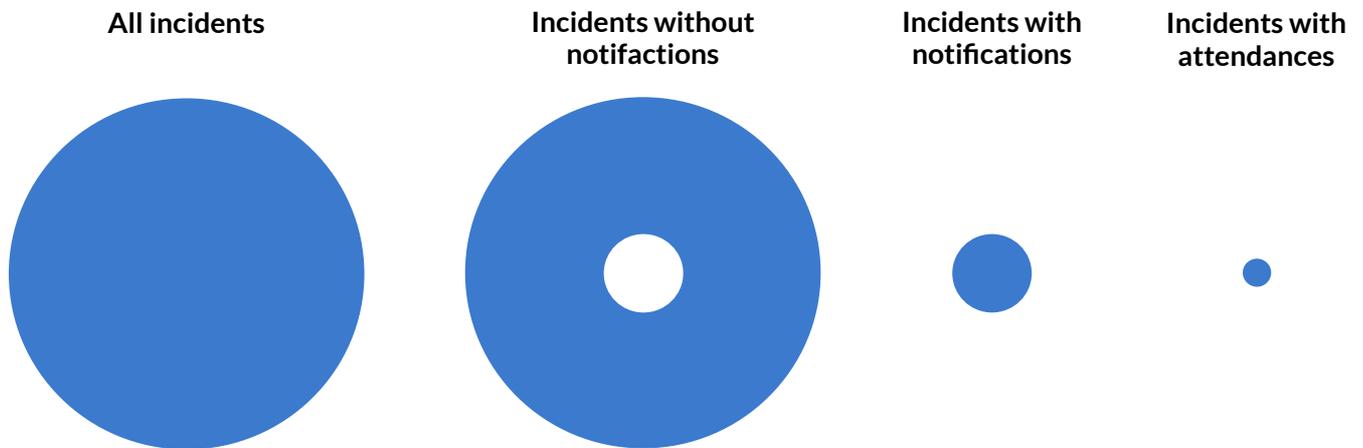
Quantitative Analysis

The purpose of the quantitative analysis was to evaluate whether the use of GoodSAM has had an impact on the bystander-initiated CPR rate, the bystander use of defibrillator rate, survival to hospital admission and survival to hospital discharge.

In order to do this, we identified comparison groups of incidents that could be used, if the absolute number of incidents was high enough, to answer these questions. These groups are shown below:

To compare whether GoodSAM has had an impact on the outcomes we were interested in, we looked at three subsets of incidents:

1. All incidents that were suitable for a GoodSAM responder to attend but where no notification was sent because a responder was not in range.



2. All incidents that were suitable for a GoodSAM responder but where at least one GoodSAM responder was in range and sent a notification.
3. All incidents where a GoodSAM responder accepted, and did not drop, the notification.

A comparison between one and two would give us the effectiveness of the integration in increasing a particular outcome, while looking at three would help us understand to what extent any difference between one and two was the result of GoodSAM attendances or just chance.

To generate these comparison groups, we needed three sets of data:

1. A list of incidents from GoodSAM giving a unique identifier for each incident, the time at which it happened and how many responders were notified.
2. A list of all incidents from LAS that matched the first list of GoodSAM incidents, and included the CAD number for that incident.
3. A set of incident data from LAS's clinical audit department that matched the GoodSAM determinants, had been audited to confirm each was a cardiac arrest and had been supplemented with data for each incident showing whether bystander CPR had been performed, whether bystander defibrillation had happened, whether ROSC had occurred and whether it had been sustained to hospital.

We then wrote scripts using a programming language called Python that generated the three comparison groups from the third dataset above by filtering it based on notifications and acceptance.

These subsets of the third dataset corresponding to the three comparison groups were then analysed in Excel to identify the numbers and percentages for each of the outcomes.

Survey

After the interview analysis had been completed and the main behaviour patterns identified, we created a short multiple choice survey to be sent to the remaining responders who had attended an incident

The purpose of the survey was to establish to what extent the behaviour exhibited by the responders interviewed—such as how they travelled, whether they attended, whether they conducted CPR, whether they would respond again—was representative of other responders who did not volunteer for interviews.

The survey was sent to 19 people and received seven responses.

Report Structure

The remainder of this report is structured as follows:

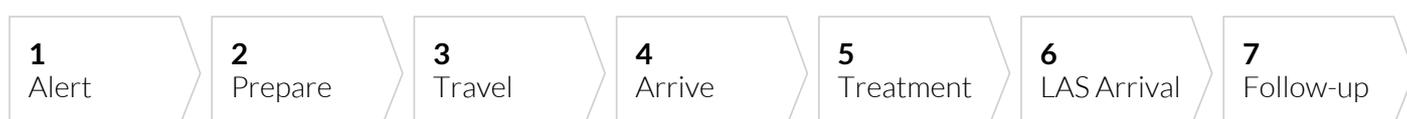
- **Chapter 3** presents an account of the behaviour of responders when responding to an incident at different stages, along with any issues that may represent opportunities for improvement.
- **Chapter 4** presents the findings of the quantitative analysis.
- **Chapter 5** summarises the findings from the previous two chapters along with any implications and recommendations.

3. Responding to an Incident

This chapter presents an account of the behaviour of GoodSAM responders when responding to an incident. It describes the different stages of activity involved in responding to an incident, what responders typically do at these stages, and any issues and exceptions at each stage that indicate areas for improvement.

The User Journey of Responding

For the purposes of structuring the interviews and to aid in analysing and communicating the output, we devised a high level description of the stages of responding to an incident. These stages are shown and described below.



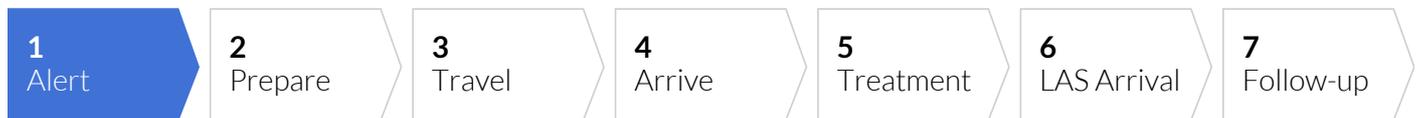
- **Alert:** The responder receives the notification on their phone alerting them to an incident where they may be able to help.
- **Prepare:** The responder readies themselves to leave to attend the incident.
- **Travel:** The responder travels to the incident.
- **Arrive:** The responder arrives at the location and gains access to the incident.
- **Treatment:** The responder assesses the patient and administers some kind of treatment.
- **LAS Arrival:** The paramedics arrive at the scene. This can happen before or after the arrival of the GoodSAM responder.
- **Follow-up:** The responder leaves the incident and returns home or to work.

We used the findings from both the interviews and the survey—which together represent 22 incidents—to give a picture of typical behaviour at each stage of this journey.

The following pages go through each stage of the journey and describe for each stage what typical responder behaviour is and any notable exceptions from this. We also highlight any issues responders encountered in order to identify opportunities for improvement.

These findings are based on the experiences of GoodSAM responders who are predominantly experienced responders outside of GoodSAM: LAS staff, Community First Responders, Emergency Responders and other emergency services professionals. As such, the typical behaviour described here may be different from what could be expected in the long term when there are more first aiders signed up.

Alert



Responder Behaviour

The GoodSAM responders we spoke to are normally at home at the beginning or end of the day when the notification arrives on their phone.

As a result, they have a sense of surprise and even shock when the alert arrives and the app's distinctive alert sound plays. In general, this is the first time they have received an alert.

“I'd just got up after a late shift. I went to the toilet and when I came back I saw my phone buzz. I've been to loads of cardiac arrests before, but I felt a bit scared in a way.”

The responder will then check the location of the incident and accept or reject the alert depending on their availability: if they are busy at work, looking after children or have had a drink they will not attend. Most responders will be familiar with the location they are being sent to.

Exceptions

- Most participants were at home at the time of the alert arriving, but four others were in different circumstances: one was driving their car, one was a passenger in a car, one was on a bus and one was on a work shift.

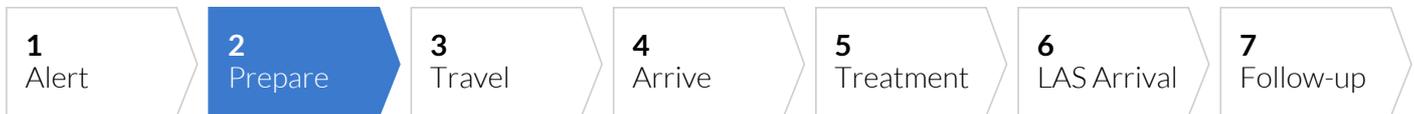
Issues

- **Silent mode:** almost half of interview participants had their phones on silent and happened to see the screen flash or heard it buzz. Some of the participants had missed alerts because their phone was on silent and not with them.
- **Rejecting an alert:** a few participants who had rejected an alert commented that pressing reject and then seeing nothing felt strange.

“I'm not sure why but it felt very strange to press reject and then not see anything else.”

“I felt really guilty that I was unable to attend the alert. I hope if it happens again I will be able to attend.”

Prepare



Responder Behaviour

After deciding to attend, the responder prepares themselves for action. They may take basic medical kit (such as airways, gloves or scissors) if they have some to-hand. Some responders out of the ones we spoke to take work ID or official clothing (if they are, for example, a police officer or work for LAS) where they have it available.

“I slung my CFR jacket on — just in case I didn’t know the paramedics or I needed to reassure the caller.”

They typically do not check the map to see if there is a defibrillator nearby: some of the responders had a defibrillator in their car which they took with them and the others had previously checked the map of their local area when they installed the app and felt that they knew there was nothing nearby.

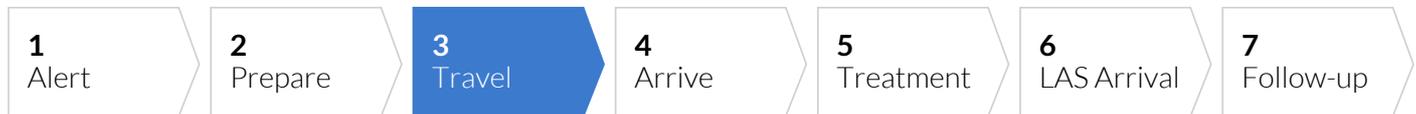
Exceptions

- One interviewee—an experienced police officer—misread the address because of the adrenaline rush they had after the alert arrived.

Issues

- **Mismatch of locations:** in a few incidents, the location shown on the map was different from that represented by the street address and the responder was aware of this discrepancy.
- **Not checking for defibrillators:** responders rarely check the map for defibrillators when a new alert arrives.

Travel



Responder Behaviour

Some of the responders we spoke to run or jog to the incident and some drive. Responders keep the phone near them when travelling — those running to the incident mostly had it in their hand, those driving had it out on the seat next to them.

Responders running to the incident might check the app on the way to see if they were heading in the right direction.

In general, responders easily find their way to the location, but if they are confused about where to go, they might try to send a message using the app messaging functionality to clarify the address.

“I went back to the app to confirm the location and sent a message to find out exactly where it was.”

Exceptions

- One responder called 999 to clarify the location of the incident.
- Two responders—both LAS staff—bumped into a FRU on the way and helped them out, one by helping them find the address, the other with carrying kit in.

Issues

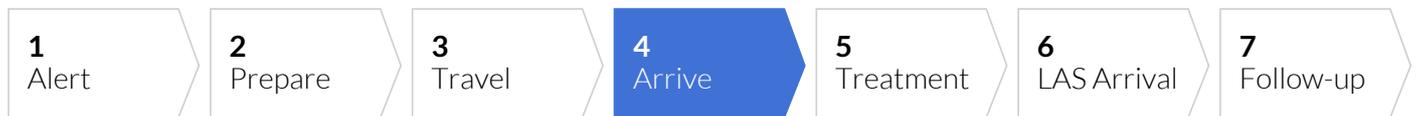
- **Driving to incidents:** responders are not supposed to drive to incidents, and yet for our sample—largely made up of LAS staff, CFRs and ERs who are used to driving to incidents—they did so for around half of incidents.

“I decided to drive — it’s a two minute drive or a few minutes to run and my car was right outside my flat.”

This issue is further addressed in the final section of this report.

- **Messages are not sent to control:** while responders expect messages they enter to go to control, they are not sent as responders are not an official resource managed by control.
- **Going the wrong way:** a few responders went the wrong way initially, perhaps because of adrenaline.

Arrive



Responder Behaviour

When the responder arrives at the location, they get out their phone and look at the app to check the house or flat number and that they are in the right place, often pressing the “on-scene” button.

“I looked at my phone again on arrival — I wanted to check which flat it was before I rang the buzzer.”

The responder may be the first on scene, but, from the people interviewed and surveyed, they are more likely to arrive at the same time as or after the paramedics—these are priority incidents for LAS that get a fast response.

In order to gain entry to the property where the incident was taking place, a responder will use the official clothing or ID they might have brought, and allude to the fact that they know the person has called an ambulance.

“I said ‘did someone call an ambulance?’, explained I’d been alerted via an app and showed my ID.”

If the paramedics were already there, the responder will introduce themselves to them, explaining that they have come through GoodSAM. The majority of paramedics seem to have heard of GoodSAM although may be surprised to see them.

Exceptions

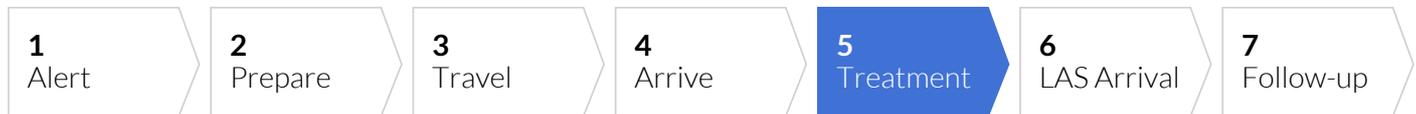
- Some responders arrive at the scene and do not attend the incident because there are already a number of paramedics or doctors present. These responders often then drop the call.
- Some responders do not check the app again or press on-scene on arrival—they find the location easily and are focused on helping the patient.

Issues

- **Not being able to find the address:** a couple of people could not find the address in the app after arriving at the scene:

“I got there and couldn’t see the address, I was pressing buttons to find it and getting really frustrated.”
- **Confusion with control:** at one incident where a LAS staff member responded for GoodSAM and was wearing a LAS tabard, a family member told ambulance control that the ambulance had arrived, which caused confusion for control and in turn some anxiety for the family.

Treatment



Responder Behaviour

If the responder is first on scene, they are likely quickly to gather basic background on what has happened from other people present and assess the patient's breathing. They might also ask another person present to go outside to wait for the ambulance.

“The casualty was on the bed — I did a quick check for airway and breathing and counted audibly – helps to remind you of your training. It was quickly obvious that he wasn't breathing and I needed to start CPR.”

They will then start CPR or put the patient into the recovery position or otherwise help them to come round.

If the paramedics are already there, the responder is likely to perform CPR on rotation or help out with other treatment if they are sufficiently experienced.

Exceptions

- In a few incidents, someone present was still on the phone to ambulance control and the call taker was made aware of their presence. In one of these incidents, the responder updated the call taker on the status of the patient.
- One responder called 999 to update control that the patient was deceased.

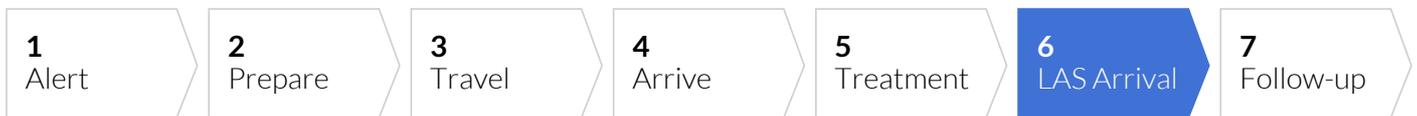
- In one incident, the responder attended the incident but did not help out as the paramedics were already there and he was not needed.
- One responder typed an update on the patient into the messages and expected it to get sent to ambulance control.

Issues

- **Should responders be assessing the patient?** One responder did not feel it was their place to assess the patient or do anything other than CPR, but after the patient was pronounced long dead by the paramedic, they felt guilty for administering CPR when there was no chance of resuscitation.

Another responder was glad they arrived at the same time as the paramedics as a do-not-resuscitate certificate was found and the responder said that they would not have thought to look for one.

LAS Arrival



Responder Behaviour

Responders who are first on scene, are likely to briefly explain what has happened for the paramedics when they arrive.

“I explained to the paramedic what had happened and continued doing CPR.”

For responders who arrive with or after the paramedics, they are likely to introduce themselves to the paramedics as they arrive as being a responder sent by GoodSAM.

Paramedics have in general heard of GoodSAM but are surprised to actually see a responder at an incident.

Paramedics make the most of the presence of an additional pair of hands, involving the responder in CPR and other appropriate tasks.

There is likely some kind of parting conversation between the paramedics and the responder: sometimes a debrief, sometimes taking a name or number and sometimes a thank-you for helping.

Exceptions

- Some less confident or less experienced responders might feel a bit awkward introducing themselves to paramedics.

“I went up to the ambulance window and told them that I’d been alerted by the GoodSAM app. I’m not sure if they knew what that was; it was a bit awkward, and I wasn’t sure if they wanted me to come with them.”

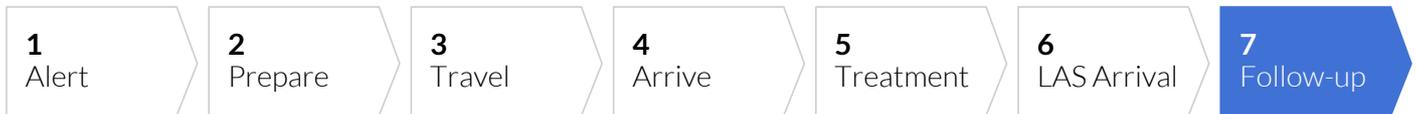
Issues

- **Wearing LAS uniform can be confusing:** responders wearing LAS uniform can confuse paramedics briefly:

The paramedic was a bit confused because I was in a yellow jacket, I said I’m an ambulance service doctor, live nearby, and was sent by GoodSAM. I’m not sure if they knew what I was talking about but they’re used to people being on scene.”

- **How far away are they?** a few less experienced responders felt some anxiety when they arrived at not knowing how long they might have to wait for the paramedics to arrive.

Follow-up



Responder Behaviour

After the incident, the responders will probably open the app again to see if there is anything more for them to do.

Those who help the paramedics or family and others present have a strong sense of satisfaction, even when the patient was not in cardiac arrest or did not survive.

“I felt good [afterwards]. It was nice to help out someone local, nice to stop them doing CPR unnecessarily and good to help them into the recovery position.”

All responders keep the app turned on afterwards and would respond again if they received another alert.

Responders tell other people about the app more after responding to an incident and many also actively encourage others they know to sign up.

“The fact that I got an alert has made me talk about it more. Now that I know it actually works, I try to encourage other first-aiders to sign up.”

Exceptions

- One responder received an alert within a few days of signing up and was unnerved by the alert when they felt they knew so little about how the app works. They started turning their phone off at night to make sure they were not woken up by it.

Issues

- **Adrenaline low:** less experienced responders might have an adrenaline low or a “surge of feelings” after responding. For most of the responders spoken to, this was their first experience of responding to a GoodSAM alert. Those who had responded to more than one felt more comfortable the second time around.
- **Mixed feelings after an incident:** a few responders have some level of discomfort after the incident, including feeling bad for misreading an address, anxiety at how often they might be alerted, disappointment at not being of more use, or guilt at trying to resuscitate someone who was long deceased. These reactions did not, however, affect their willingness to continue responding.

4. Impact

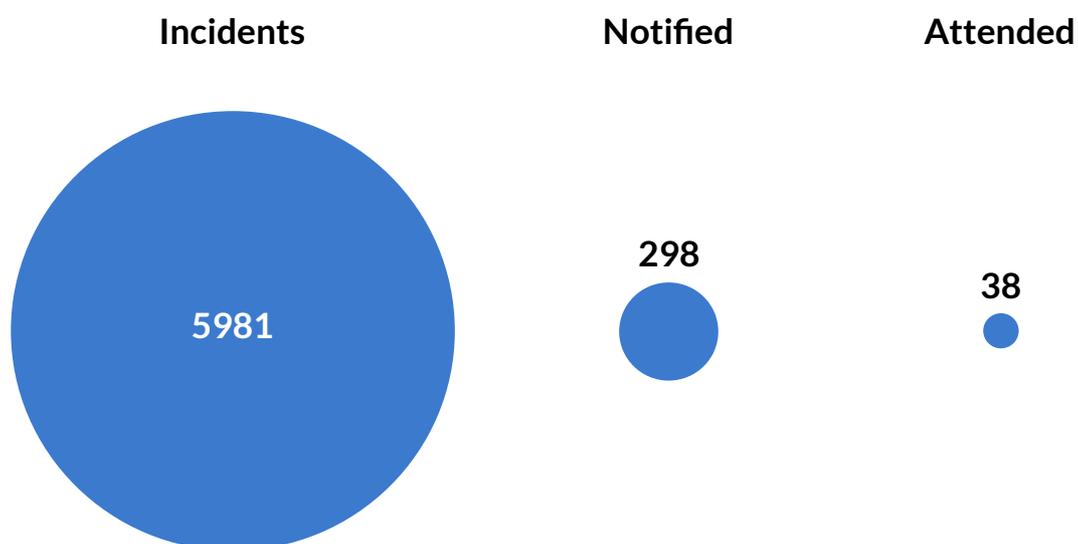
This chapter presents the evidence on what impact the use of GoodSAM by LAS has had on the outcomes described earlier: the number of bystanders attending cardiac arrests, the use of defibrillators by bystanders, survival to hospital admission of those receiving bystander CPR and survival to hospital discharge of those receiving bystander CPR from a GoodSAM responder.

It puts this impact in context by giving an overview of the activity of the system since launch by looking at the proportion of suitable incidents that were actually attended by a responder and the factors that affect this.

All the data in this analysis is for the period from 16th July 2015 to 29th February 2016, which will be referred to as the evaluation period.

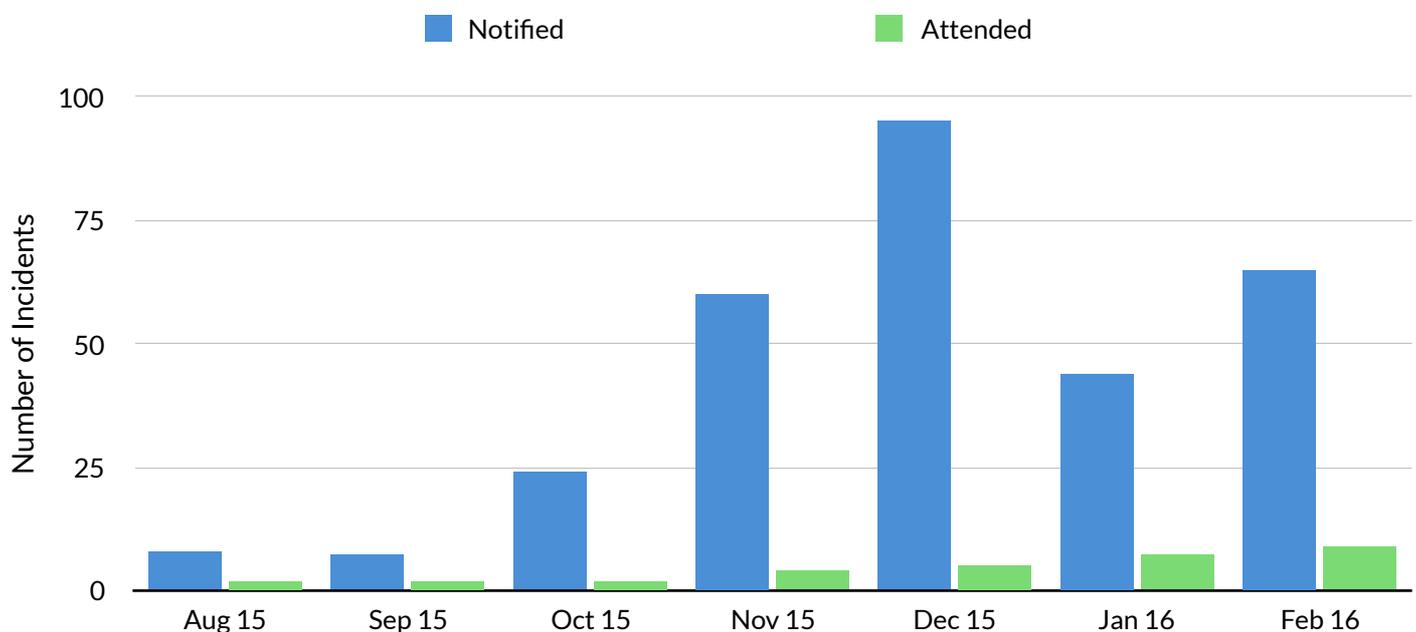
Analysis of Alerts and Attendance

The graphic below shows the number of incidents in the evaluation period which were suitable for a GoodSAM responder to attend, the number of incidents for which at least one GoodSAM responder was notified and the number of incidents in which it is believed that a GoodSAM responder attended.



So, for 5981 incidents that were assessed as being suitable for a GoodSAM responder, 38—or 0.6%—were attended by a GoodSAM responder. A further analysis of the incidents by LAS’s Clinical Audit Department showed that 2722—or 48%—of these incidents were found, in reality, to be cardiac arrests.

The graph below—showing number of incidents per month in which at least one person has been notified about an incident and the number of incidents per month where it is believed a GoodSAM responder attended—illustrates how this is varying over time. Not shown in this graph is the total number of eligible incidents: this has fluctuated around 820 per month over this period and has not shown a trend upwards or downwards.



There has been a clear increase in the number of incidents in which at least one responder was notified. The false peak in December 2015 was caused by a large number of SMS notifications being sent due to the alerting radius for SMS alerts being set much larger than that for mobile push notifications.

Along with this increase in notifications there has been a slow increase in the number of people attending, rising from 2 in August 2015 to 9 in February 2016.

The number of people notified about any particular incident is influenced by two main factors:

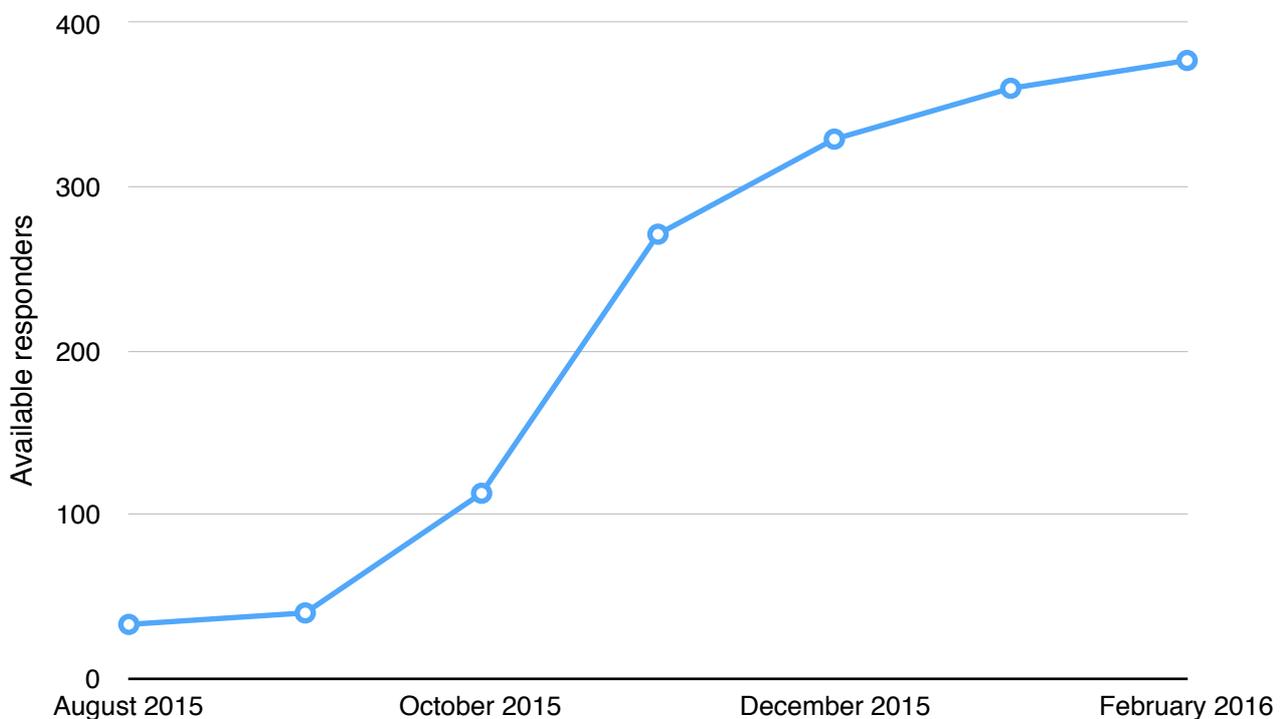
- **Responder density:** the number of responders available in the system, which depends on people continuing to sign up and continuing to make themselves available through the app.

- **Alerting distance:** the distance as-the-crow-flies from the location of an incident that defines the radius of a circle within which potential responders are sought.

These two factors are looked at in more detail below.

Number of Responders

The graph below shows how the number of responders in the system has been growing during the evaluation period. This growth in responders is almost certainly the cause of the increase in incidents with notifications and attendances during the evaluation period.



The rate of growth of responders has reduced in the last few months, but there are opportunities to continue to grow this number through signing up large groups of people such as members of St John's Ambulance and progressively signing up first aiders as they are trained.

Alerting Distance

The second factor affecting the number of people notified about an incident is the alerting distance. This has been set to 200m during the evaluation period.

With the alerting distance currently set at 200m, a GoodSAM responder is receiving an alert 5% of the time (298 incidents out of 5981). GoodSAM have made available data based on their

records to show at what length the alerting distance would have to be set to to alert a particular percentage of responders.

The table below shows, for the evaluation period, what the radius would have to have been set at to ensure that a given percentage of incidents had at least one responder, taken from the data and analysis provided by GoodSAM.

Desired percentage of incidents with notifications (%)	Required alerting distance (m)
5	200
10	313
15	394
20	479
30	640
40	798
50	974
95	2715

The data for the evaluation period shows that in about 13% of incidents where a notification is sent, someone attends. If we assume that this rate of attendance is constant as the alerting distance increases (in fact, it may decrease as the increased distance may put some people off attending), we can project how different alerting distances might impact on the number of incidents attended.

For example, if the alerting distance were to be increased to roughly 400m, this would now lead to 15% of incidents—or 894 for the evaluation period—receiving a notification and up to 116 incidents having a GoodSAM responder attending (although this number may be a slight over-estimate).

Any increase in alerting distance would need to be balanced against what may be an increase in the likelihood that a responder decides to drive to an incident rather than walk, in breach of the governance and code of conduct. From the responders we spoke to, we know that at longer distances they were more likely to decide to drive.

Analysis of Outcomes

This quantitative evaluation is primarily concerned with the app integration's affect on a number of measures of impact. These measures and the findings associated with them are described below.

The incidents included in this analysis exclude those that were witnessed by LAS crew and those where resuscitation was not attempted.

Bystander-Initiated CPR Rate

To understand what impact the integration with GoodSAM has had on the bystander responder rate (defined as the proportion of cardiac arrests in which a bystander initiates CPR before the arrival of emergency services personnel), we combined data from GoodSAM and LAS to identify those incidents where at least one GoodSAM notification was sent and those incidents where no notification was sent. We then used a further dataset from LAS's Clinical Audit Department to evaluate how often bystander CPR had been performed for these two sets of incidents. The table below illustrates our findings:

Bystander CPR performed	Incidents with no notifications	Incidents with at least one notification	Incidents with GoodSAM attendance
Yes	943	55	10
No	359	14	2
Percentage bystander CPR rate	72%	80%	83%

So, incidents where at least one notification was sent and those where a GoodSAM responder attended have a higher bystander CPR rate than those where no notification was sent. However, the absolute number of incidents here is not large enough to say that this difference is statistically significant.

Use of Defibrillators

To understand impact on the rate of bystander use of defibrillators we took the same approach, but looked at incidents where there was use of defibrillators prior to the arrival of LAS. The table below illustrates our findings.

Bystander CPR performed	Incidents with no notifications	Incidents with at least one notification	Incidents with GoodSAM attendance
Yes	51	7	2
No	1251	62	10
Percentage bystander defib rate	4%	10%	17%

Incidents where a notification or a GoodSAM responder was sent had a higher rate of prior use of defibrillators, but the absolute numbers are not high enough to draw any conclusions.

Survival to Hospital Admission

We also wanted to understand what impact, if any, GoodSAM has had on survival. The first survival measure we looked at was the short-term measure of survival to hospital admission.

Survival to hospital admission	Incidents with no notifications	Incidents with at least one notification	Incidents with GoodSAM attendance
Yes	367	16	1
No	935	53	11
Percentage survival to hospital admission	28%	23%	8%

Incidents where a GoodSAM responder was sent had a lower rate of survival to hospital admission, but as with the other measures investigated, the small numbers involved mean that no conclusions can be drawn from this.

Survival to Hospital Discharge

An analysis of survival to hospital discharge for the incidents where a GoodSAM responder attended was conducted by LAS's Clinical Audit Department. This showed that for the 38 incidents where a GoodSAM responder is thought to have attended, none of the patients survived to hospital discharge. Again, the small number of incidents means that we cannot draw any conclusions from this.

4. Case Studies

This chapter presents three case study examples of responding to an incident, telling the story of three individual responders and their experiences.

1. First Aider 1

Alert

First aider one was at home, in his living room, when he received a GoodSAM alert on his phone at about 5pm. His partner had just arrived home from work and they both wondered aloud: “what on earth is causing that noise?!”

Prepare

He realised that it was the GoodSAM app and the adrenaline started pumping: he knew it must be serious or he wouldn't have been alerted. He quickly pressed accept on the app, got his shoes, keys and phone and left the house.

The location of the incident was on a street he used to live on, two or three streets away, so he knew where to go and how to get there. He had previously checked for defibrillators in his area so knew that there probably wasn't one nearby, but (unlike almost every other responder) he did double-check to see if there was anything new nearby.

Travel

He ran all the way to the incident, holding his phone in his hand as he went. He knew the area well so knew where it was safe to cross the road.

Arrive

The first aider looked at his phone again on arrival — he wanted to check which flat number it was in order to ring the buzzer. He was feeling full of adrenaline and impatient to help. He entered the flat number into the intercom system and introduced himself by saying: “Hello, I'm a local first-aider, I hear you've called an ambulance and I'm here to help.”

He was let in and went straight to the room where the casualty was. As he arrived he pressed the “on-scene” button on the app then put his phone on a side table in the room.

Treatment

He asked the person who had phoned who the patient was and what had happened. The patient was on the bed and he performed a quick check of their airway and their breathing, counting to himself audibly to help remind him of his training. It was quickly obvious that the patient wasn't breathing and that he needed to start CPR. He and two others present lifted them onto the floor.

He then asked one of the others present to go to the door to wait for the ambulance. The others then asked "Oh, are you not the ambulance?" and he had to explain again that he was a local first-aider sent to help and that the ambulance is on its way, which reassured them.

He took a deep breath and listened to the casualty's breathing again — he wanted to reassure himself that he was definitely doing the right thing. He found the right place and started doing chest compressions.

Once he'd done one round of chest compressions, he started asking questions about the patient: did they have any long term conditions? has this ever happened before? what happened before this? how long have they been in this condition? He did four or five rounds of chest compressions and by then the paramedics had arrived.

LAS Arrival

When the paramedics arrived, he explained to them what had happened while continuing to do CPR. He told the paramedics who he was and the paramedics asked him to continue, setting up a metronome to help him do the chest compressions more slowly. Eventually, the paramedics took over chest compressions and he continued to help out with moving furniture, holding an IV bag and more chest compressions. They tried to resuscitate for 20-30 mins but it became clear that the patient wasn't responding.

Follow-up

The first aider said goodbye and said sorry for not being able to help more. As he was leaving, he spoke to a paramedic who said thank you for helping and thank you for responding. He explained he'd been alerted through an app and they said "Oh, is that GoodSAM?"

After leaving he looked at his phone and the alert was still running: he had to press back to close the app. He wanted more closure than this, some way to say that he was leaving the scene and the ambulance had arrived.

About an hour after he arrived home he had an adrenaline low and an accompanying surge of emotions — this had happened locally so what if he bumped into the casualty's partner?

In the days and weeks following the incident, he started telling more people about the project: he told people that he met and socialised with about his experience and emailed some first aiders he knew to encourage them to sign up.

Recently, he had to turn the app off for a week when his partner was away for work: having had an alert he doesn't want to get one and have to say no. He couldn't turn it off for a specific period so had to log out and remember to log back in later, which he forgot to do.

He always thought GoodSAM was a great idea, but said that responding really gives you a sense of how quickly you can get there if you run and gives you a great sense of efficacy to play your part in helping someone else.

2. Healthcare professional 1

Alert

Healthcare professional one had just eaten dinner, sat down with a coffee and put on the telly when the alert arrived. This was the second time he'd been alerted so he knew what the sound was and what to expect.

Prepare

He checked the location and realised he knew where it was. He put his phone in his pocket, grabbed a bag that had some medical kit in—airways and bandages—and ran out. He also took his wallet which had his LAS ID in.

Travel

He decided to travel by car as it would have been a run of a few minutes and his car was right outside his flat. He drove to where he thought the incident was and checked that he was where the pinpoint on the map was. He was hoping there would be someone there who would know what was going on, but there was no one there.

He opened the app to check the address but couldn't find the written address on the screen. He was pressing buttons to find the address and getting really frustrated, feeling that time was running out. Eventually he found it but it was obviously in a different location from the location of the marker on the map.

Arrive

He drove back to where the written address was but still couldn't see anything. But then, he bumped into a first responder unit. The FRU had the right address but the wrong marker location so he showed them where to go and they drove their together.

The address was in a very big block of flats that loops around and the different locations all seemed to refer to different parts of it. As he arrived with the FRU, they saw that the ambulance crew had just arrived.

Treatment

The crew were glad to see them. He and the FRU did CPR while the medics sorted out drugs, and airways. They performed CPR between them for 20 - 25 minutes, but the patient—who had been down for an unknown period of time—didn't respond to it.

Follow-up

Afterwards, he spoke to the neighbour who had called 999 to comfort them and gave his name and number to the paramedics for the incident report.

He pulled out his phone and looked at the app to see if the address information was still the same, but he found it a bit confusing as the alert had expired and there was nothing there anymore. He was confused but didn't want to play around with it too much to see what happened in case he set something off.

He went home and told his partner about the experience. It felt good to be able to help even though the crew were already there, and he would definitely do it again.

3. Healthcare professional 2

Alert

Healthcare professional 2 was just back home from work and had had dinner when the alert went off on her home and made her “bloody jump”. She'd been registered with GoodSAM for a long time without an alert so was surprised when one came through.

Prepare

She accepted the alert but was a bit confused because the location on the map wasn't where the house address was. She put on her LAS jacket and took a bag with basic medical kit in that were both in the hallway.

Travel

She started walking and jogging and reopened the app as she went to try and confirm where the location was; she tried to send a message using the messaging functionality to find out exactly where it was. She got most of the way there and then had a message saying she'd been stood down — the alert had been cancelled. Then, she got another alert, but this time it didn't seem to give any details of the address.

Arrive

At this point, she was on the street outside where she was supposed to be and looking for someone who looked like they were looking for an ambulance. She found someone in the street — it was helpful that she was wearing the jacket — and went inside at the same time as a private ambulance was arriving. She went into the property and found a parent giving CPR to their child.

Treatment

She told the parent to stop so she could have a look at the child — the child had a pulse and looked as if he was post-seizure. She asked some basic questions about how long the patient had been like this? had it happened before? were they epileptic? The patient wasn't responsive but wasn't actively seizing so she put them into the recovery position.

Someone there was still on the phone to ambulance control; she told them that it wasn't a cardiac arrest so that this information could be passed on.

LAS Arrival

Then the private ambulance crew came in and, just as they were opening their bags, a LAS paramedic arrived as well.

She told the LAS paramedic what had happened. The paramedic was a bit confused because she was in a yellow jacket. She explained that works for LAS and lives nearby and that she had been sent by GoodSAM. She wasn't sure if the paramedic knew what she was talking about but they just got on with it — they're used to other people being on-scene. They then worked together to prepare and administer some treatments before the patient was taken away.

Follow-up

After the incident she got her phone out to see if there were any messages or if there was some kind of button to press to say that she was leaving the incident, but couldn't see anything. She walked home and finished her evening.

She felt good to help out someone local and in particular to stop the parent administering CPR which could have damaged the patient. She was also satisfied that she had been able to let ambulance control know that it wasn't a cardiac arrest as they then stood down an advanced paramedic who would then have been available for other incidents.

5. Findings and Implications

This section summarises and discusses the most important findings from the previous two chapters. For each finding, it describes what it is and discusses any implications that it may have for the ongoing development of the GoodSAM app and its integration with LAS.

GoodSAM responders are getting involved

All but one of the responders interviewed and surveyed arrived successfully at the incident they were alerted to. Out of the 22 incidents that they were alerted to, GoodSAM responders gave practical assistance on-scene about half of the time. This included CPR in around a third of incidents, both in situations where the responder was first on scene and in other situations where the paramedics were first on scene but where the paramedics got the responder involved. It also included other basic first aid and assistance such as moving furniture or reassuring family and other present.

This shows that GoodSAM responders are doing a good job of helping out when they are first on scene and that paramedics are effectively involving them in treatment.

It also demonstrates that while arriving before the paramedics may have the biggest impact on a patient's chances of survival, there is still a lot of value for both patients and paramedics from a GoodSAM responder arriving at the same time as or after the paramedics. This fact is worth communicating to responders so that they still consider attending even if they cannot arrive within the first few minutes after an alert is received.

High satisfaction among responders

Almost all responders interviewed felt a strong sense of satisfaction after helping at an incident, even though in most of them the patient did not survive. All responders interviewed and surveyed are still using the app and would definitely respond again if they received another alert.

As well as these high levels of satisfaction among responders, many responders interviewed mentioned that after responding they would often tell people they knew about their experience and actively encourage other people they knew who could be GoodSAM responders to sign up.

This is an important observation as it suggests that GoodSAM could take advantage of this willingness to recommend the app to others by providing responders who have recently responded with information and resources to help them be more effective at doing so.

Low proportion of incidents where a responder was in range

There were almost 6,000 incidents in the 7.5 months of the evaluation period that initially matched the criteria for a GoodSAM responder being activated. In about 300 (5%) of these incidents at least one potential responder was sent a notification.

There are two ways to increase this proportion: the first is by increasing the number of responders and the second is by increasing the alerting distance. We understand that there are initiatives underway within LAS, in partnership with other organisations, and potentially through first aid training courses to increase the number of responders.

As discussed in section 4 of this report, increases in the alerting distance can raise the likelihood of a responder being notified and then attending. For example, while a 200m distance yielded almost 300 incidents with notifications from 6,000 incidents that were suitable for a GoodSAM responder, a 400m distance could yield as much as 1,200 incidents with notifications.

However, increasing the alerting distance may increase the likelihood of responders driving to an incident, despite this being against the code of conduct that they signed up to. As a result, the proportion of responders choosing to drive to an incident should be monitored continuously if the alerting distance is increased.

Uncertain impact

While there appears to be an increase in the bystander CPR rate for those incidents where a GoodSAM responder was notified, the survival rate for incidents where a GoodSAM responder attended is very low. However, these findings are not statistically significant because of the low number of incidents involved.

It is still early days for this initiative and the low numbers of incidents make it more or less impossible to evaluate quantitatively the impact or potential impact of the app and the integration until more responders are active on the system and a higher proportion of incidents are being responded to.

Silent mode and acceptances

Around a third of interviewees had their phone on silent when the alert arrived and happened to be close enough to it to see it flash or hear it buzz. Almost 60% of alerts sent to the mobile

phones of responders were classed as not seen — that is, the responder did not accept or reject the alert. Even taking into account that around 25% of alerts arrive between the hours of 22.00 and 07.00, this suggests that there are a large number of alerts that are never seen by potential responders as their phone is on silent.

A number of responders interviewed said they thought that the app should have an option to break through silent mode and either buzz continuously or to play a sound. We understand that GoodSAM is looking into this possibility, which could have a large beneficial impact on the rate of response to notifications..

Not looking for defibrillators

A large majority of the responders interviewed and surveyed did not check the map for a defibrillator before responding to an alert. Part of the reason for this is that many responders look around their location for nearby defibrillators when they first install the app. In most cases, they do not see anything and then do not think to look again.

As the number of defibrillators in the system increases, and given this behaviour pattern, it may be necessary to take other approaches to keeping responders informed about nearby defibrillators. Some options for this could include:

- Sending them a notification, perhaps by email, when a new defibrillator is added near their main location
- Reminding them, as part of a very brief checklist shown when they accept an alert, to check for nearby defibrillators
- Showing an arrow on the map when they are looking at an incident that shows how far it is and in what direction to their nearest defibrillator.

Driving and official identification

The current base of volunteers for the app has a large proportion of experienced responders—LAS staff, Emergency Responders and Community First Responders—as opposed to first aiders. Almost all GoodSAM responders interviewed who had access to official identification—such as a LAS jacket, CFR jacket or photo ID—took it with them and then used it in some way to gain entry to the incident.

The benefit of this approach for the responder and the patient are clear: they smooth over any potential doubt in the mind of others present as to who the responder is and whether they can be trusted. However, in some circumstances, they can cause confusion for people on scene, paramedics and ambulance control. For example, in one incident, a relative of the patient told ambulance control that the ambulance had arrived when a GoodSAM responder arrived wearing

a LAS tabard. The call-taker said they had no record of an ambulance being on scene which led to some concern from the family of the patient about who the responder was.

We also found that these volunteers are highly likely to drive to incidents: responders drove in 11 out of 22 incidents, and based on the interviews alone, it was only experienced responders who elected to drive.

These experienced responders are using official clothing and ID and driving even though they are explicitly asked not to do either in the code of conduct that they sign up to as part of the governance around the initiative. The reason for this is that they are trained and habituated to respond in this way so need more help to remember not to than other types of volunteer responder.

In order to reduce the occurrence of these two things, GoodSAM and LAS should consider ways of making the code of conduct clearer, ensuring that it is seen by them on a number of occasions and delivered through appropriate channels. For example, the code of conduct could be shown:

- On the sign up page in visual form (and not hidden in terms and conditions)
- In a introductory email after someone's application to be a responder has been accepted
- In an in-app introduction or tutorial after a responder has first downloaded the app
- As part of a very brief checklist shown to a responder after they accept an alert.

Taking emotions into account

Some responders—both those who attended incidents and those who were unable to accept an alert—spoke about the emotional side of the experience. For those who had to reject an alert, they sometimes felt guilty at having to do so. Some responders who attended an incident, particularly the more inexperienced responders, felt a rush of emotions afterwards. Sometimes, this was from an adrenaline low after providing useful assistance on scene, and sometimes from guilt or disappointment at not being able to be more helpful or from, for example, giving CPR when the patient was long deceased.

The design and language used by the GoodSAM app should take these emotional reactions into account. For example, instead of offering responders the choice to “accept” or “reject”—both very austere and almost inconsiderate words—an alert, responders could be asked if they can help and be given the choice of “yes” or “not now”. If they say they are not available, a message should appear that reassures them that the app is looking for another responder to help, instead of immediately closing down.

In addition, responders should be sent a follow-up message after responding to an alert to offer them advice on who they can speak to if they feel they need to speak to someone about their experience.

Problems finding the location

In a handful of incidents—including in the third case study above—the marker showing the location of the incident was in a different location to the address. In these situations, responders expected to be able to use the messaging functionality to clarify the location of the incident. In one incident, a responder even called 999 to clarify the address, successfully.

We know from the interviews that most responders will check the app on arrival to confirm the house or flat number. During the evaluation period, an update to the app removed the street address of the incident from the screen shown after accepting an alert. A couple of participants found this very frustrating.

GoodSAM should consider how best to allow responders to clarify the location of an incident where there is uncertainty whether by allowing them to send messages to ambulance control, or automatically notifying a responder who has accepted an alert of updates to the location. We understand that GoodSAM has reinstated the street address on the app screen following acceptance of an alert in the app's most recent update.

Status and scheduling

A couple of less technically-confident responders were not sure after installing the app if they needed to do anything to make themselves available to receive alerts and active on the system.

In addition to this, some responders wanted to be able to set themselves as unavailable at certain periods of time. One responder, after attending an incident shortly after they signed up, turned their phone off at night so that they would not receive an alert while sleeping. Another responder turned the app off while their partner was away and forgot to turn it back on—only being interviewed for this evaluation reminded them to turn it on again.

GoodSAM should consider introducing some functionality to allow responders to set their availability for alerts, potentially on both an ad-hoc basis and according to a schedule. This could also include a clear visual indicator in the app of what a responder's availability is, which would also help those who were confused by whether they were active or not.

Gaining entry

Many responders used allusions to LAS—for example, “did someone call an ambulance?”—to gain entry to an incident. Responders should be given more guidance on what to say when

arriving to ensure there is no miscommunication to others present about who they are. This could include stating that they are a local volunteer, trained in CPR who's been alerted to the incident and that an ambulance is also on the way.