
Fulton Hogan
Safety in Winter Maintenance
Adam Humphries
SaferRoads2017
5th International Conference
SAFE AND SUSTAINABLE ROAD SURFACES

Outline

Fulton Hogan

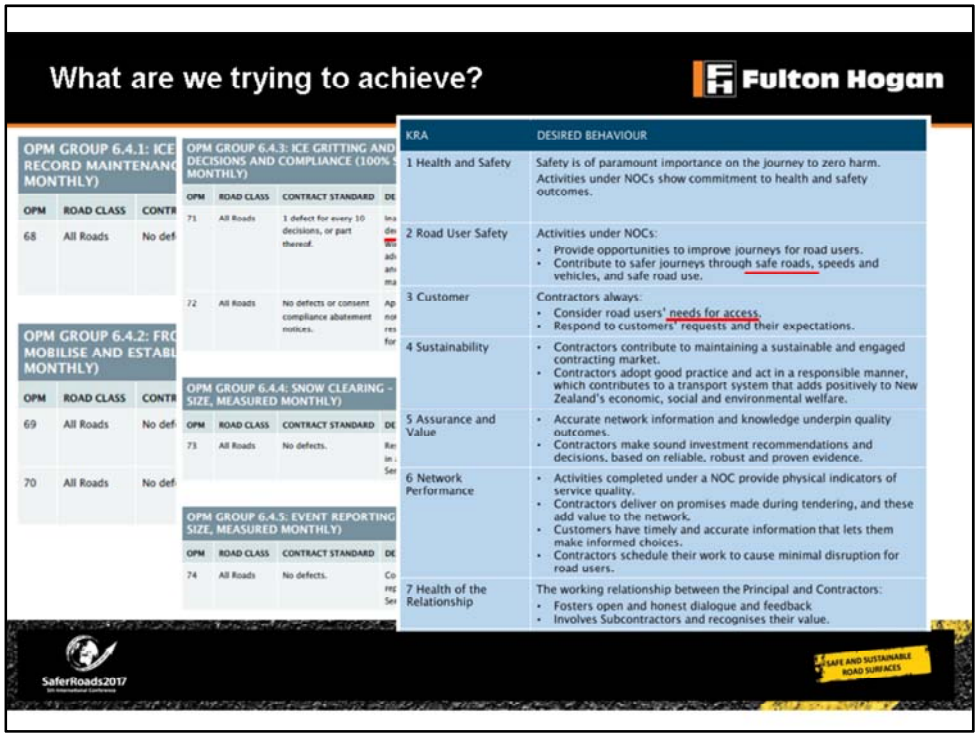
- Safe System Pillars
- Winter Maintenance
- SH1 Alternate Route
- Benefits of technology
- Thermal mapping

SaferRoads2017

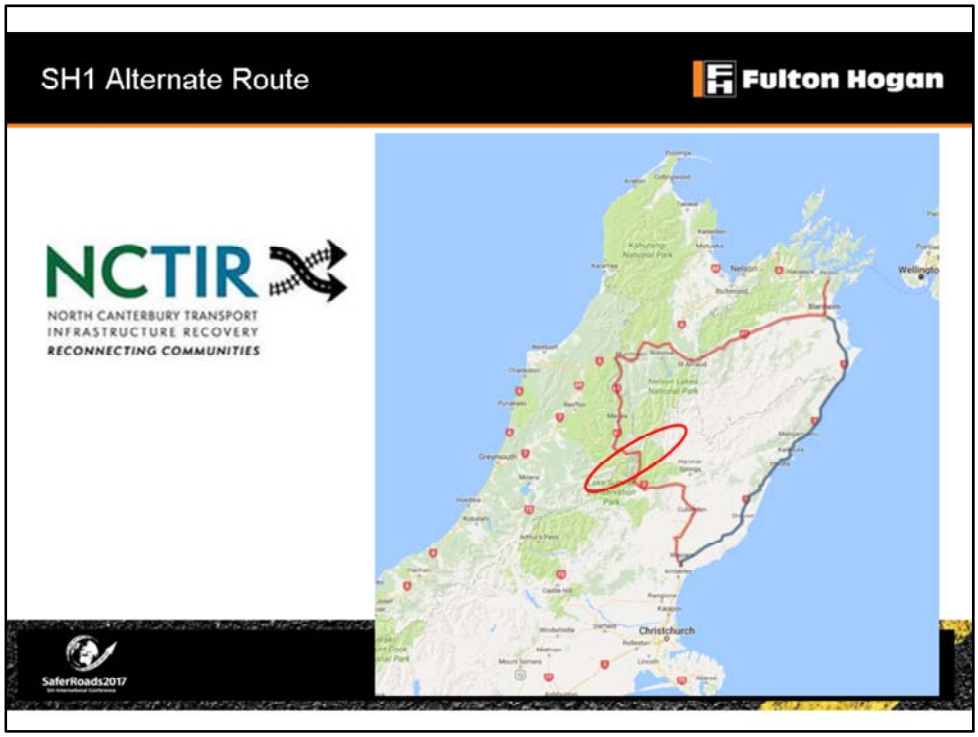
SAFE AND SUSTAINABLE ROAD SURFACES

Today I am going to talk about the safe system pillars and how our winter maintenance activities fit into this to ensure a reliable and safe road network
In doing this, I will use the current SH1 Alternate Route as a case study
Under the different safe systems pillars I will talk about technology which is being utilized and I will also cover off some developments in the thermal mapping space

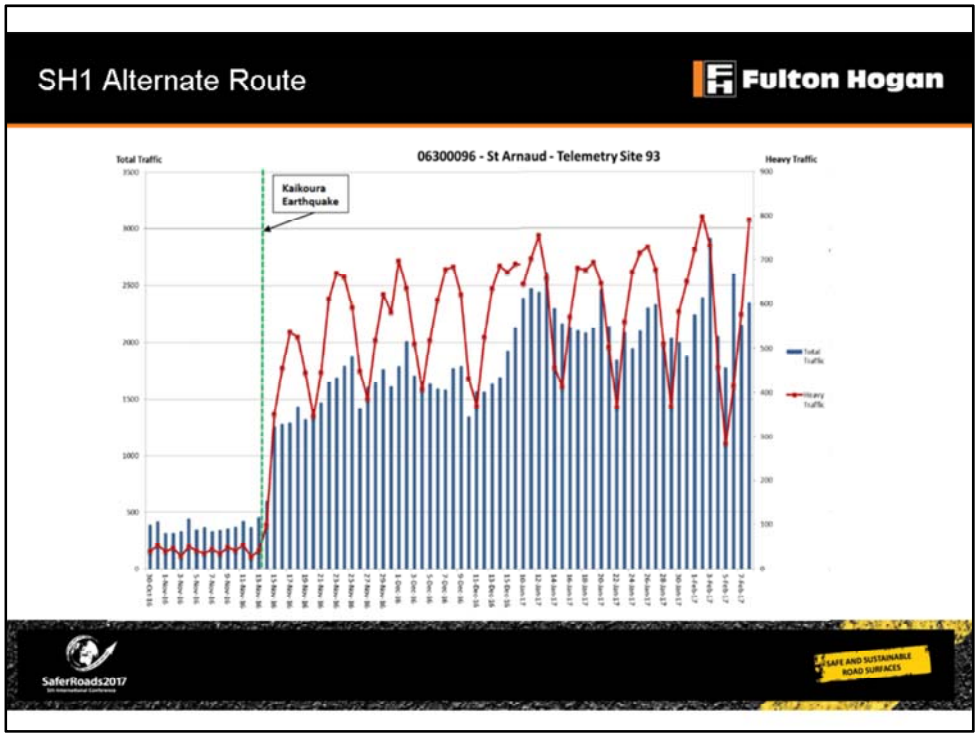
So what do I mean by winter maintenance.?
It is the planning, communication and physical works in dealing with this stuff – snow and ice. We want keep the road in a safe condition and avoid this…
At the same time we need to ensure value for money in spend and resource use with grit and deicing agents or CMA



On NZTAs SH network, winter maintenance is undertaken by the NOC contractors with a set of operational perf measures to define the level of service. These touch on making appropriate decisions, response times and keeping records.
Then there are key perf indicators which cover safety and customer need for access.



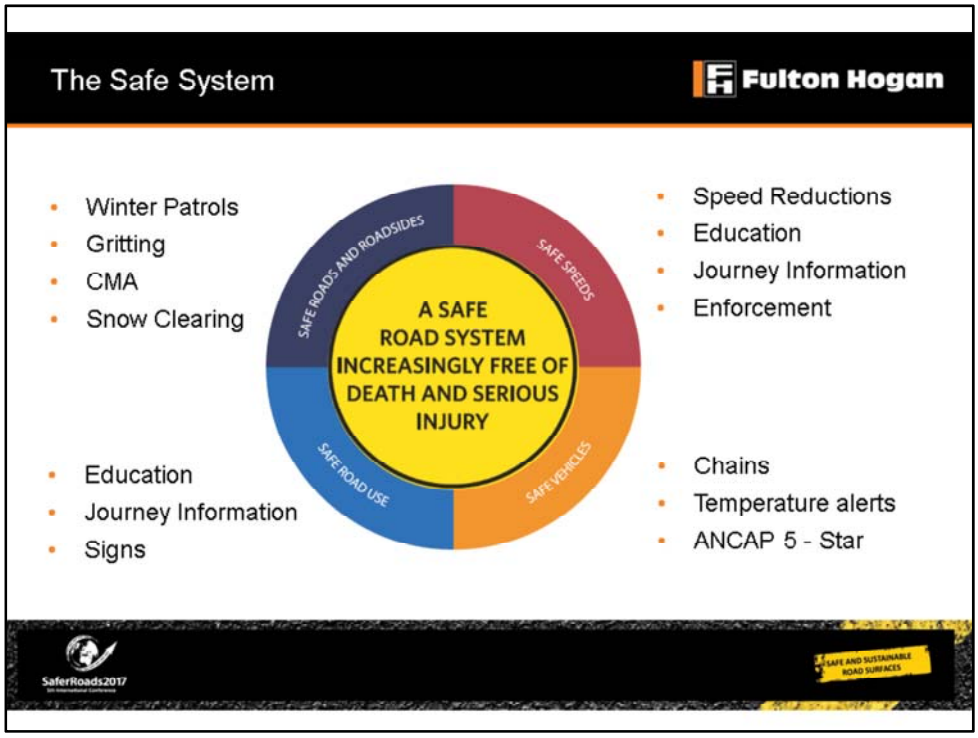
I mentioned I would use the SH1 alternate route as a case study so a little about this…
In Nov last year the kaikoura EQ hit causing extensive damage to the main North/south road and rail links. SH 1 through here, particularly large slips north and south of kaikoura.
The nth Cant infrastructure recovery alliance, comprising NZTA, Kiwirail, FH, Downer, HEB and Higgins, was formed to reinstate these links at an estimated cost of $1b. With a tight programme of a little over a year
In the mean time all nth/sth traffic, including rail freight moved onto trucks, is forced to use the alternate route detour along SH 63, 6, 65, and 7.
NCTIR are taking an overarching management role in this route with the 4 NOC maintenance contractor working across the route in Marlborough, Nelson/ Tasman, West Coast and North Canterbury
One of the challenges with this route is the winter alpine conditions with increased traffic, including Lewis pass at 900m elevation.



As an example of traffic increases, we can see that SH63 went from..

- just under 500 vechicle per day to around 2500 (5X)
- 50 trucks per day to around 700 (30%)

As much of the route was not designed to carry this level of traffic on a long term basis, NCTIR are spending around $60 m on improvements including pavement strengthening and widening, signage and guardrails and so on.



So that has set a little bit of the scene around what the winter challenges are..
In terms of providing a safe corridor for the travelling public, a number of measures have been taken across the 4 pillars.
Safe speeds

- Reductions to 80km/hr have been put in place on sections where this is a more appropriate speed for the environment, including alpine areas
- Public education and information is also critical to ensure the public understand the speed environment is different on this route.
- This is all backed up with enforcement, NCTIR have developed a strong relationship with police who have an increased presence on the road.

Safe vehicles

- Vehicles are always improving and handling in winter conditions is part of this, including warnings about temperatures, ABS braking etc.

Now we are coming into the pillars where we can have some real influence

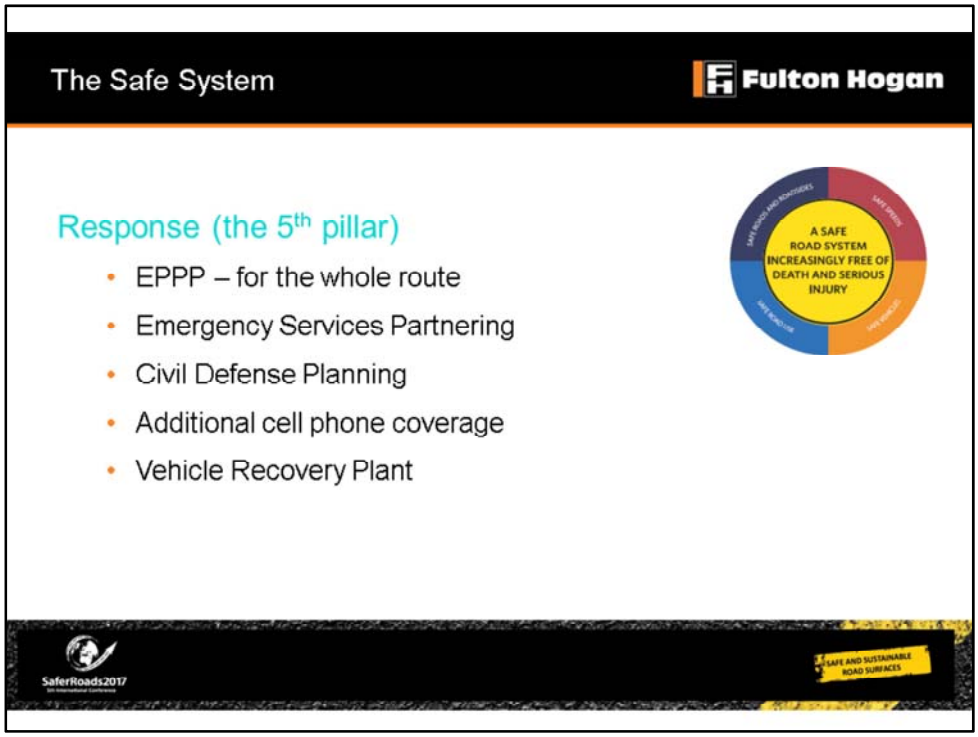
Safe Road Use

- I will cover shortly in more detail the education and journey information that is happening not just on the Alt Route but across the NZTA network for winter

Safe Roads and Roadsides

- This is the significant area where the contractors need to monitor and take both

proactive and reactive steps to keep the road clear and safe. I will be talking a lot about the technology used to facilitate this activity to get the best outcomes.



The other area where NCTIR have ensured there is appropriate consideration is response – what internationally, some countries consider as a 5th pillar to the safe system.
The emergency procedures and preparedness plan or EPPP is a NOC requirement and outlines communication lines and procedures during and event or incident. NCTIR are putting together a plan which pulls together the 4 NOC areas.
This plan includes the emergency services who have been involved in collaborative preparation
NCTIR have also worked with Civil Defense to ensure provision if there are stranded motorists in a storm
Additional cell towers have been put in place which greatly assist with filling communication black spots.
Truck or heavy vehicle recovery plant has been established so any incident can quickly be cleared.

Safe Road use

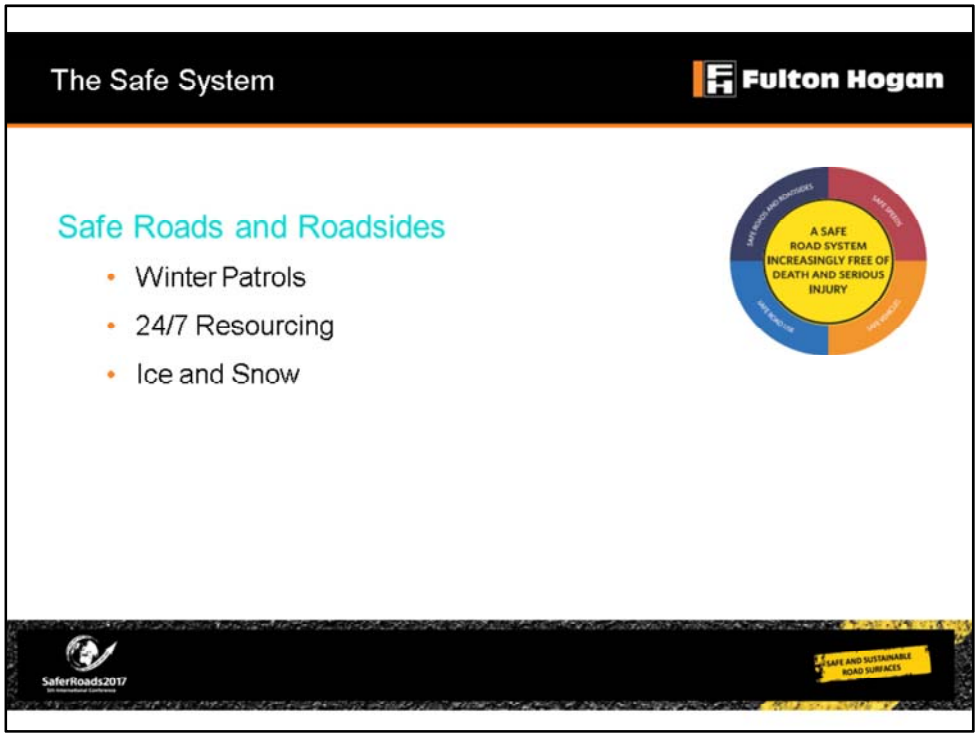
This space can be considered as education and preparing road users for the conditions they may come across and how to deal with them.

Tools include…

- a subscription text alert system for road status updates,
- NZTA facebook and twitter pages
- as well as websites including Traffic and Travel for road status and condition information.
- Specific winter driving and alternate route publicity campaigns have also been underway leading into winter.

These campaigns have been put together in conjunction with the freight industry. One of the significant collaborative initiatives is the fit-out of a large truck into an educational space. This will road-trip around different locations on the Alt Route and be a point where drivers can stop, have a break, get a drink, have chat to various people and get some information about winter driving etc.

And of course, all the above is undertaken in close partnership with police and emergency services.



Now moving into safe roads and roadsides. This is all about having good road weather information and being able to make proactive decisions, get the resource in the right place at the right time to keep the road in a safe condition….
I will now go through some of the tools and technology which is helping us do this.

In the area of forecasting – looking ahead at what is likely to happen – we rely on a number of forecasting services. There is metService and MetConnect which includes thermal mapping. Now I will come back to this shortly

In terms of tactical information – what is happening out on the ground right now – we use tools including weather stations, infrared guns and individual observations. There are usually a lot of 1-to-1 phone calls or RT conversaions across the network.

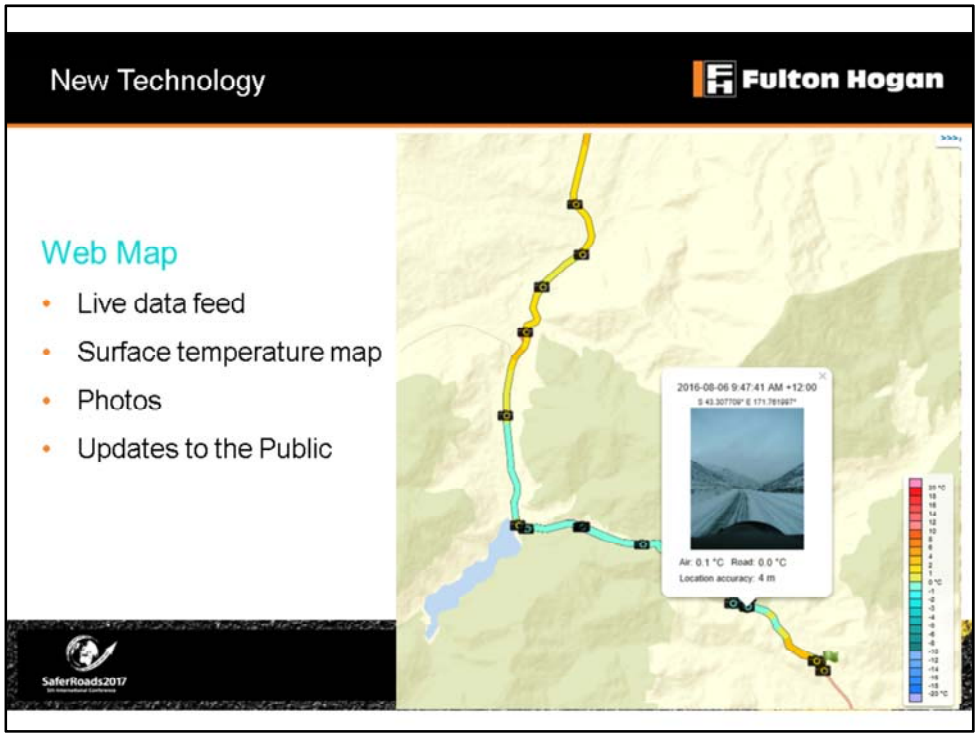
All of this is great, but the nature of these tools do leave some gaps in the information available. Winter maintenance has always involved experienced operators using a reasonable amount of ‘gut feeling’ about when to take proactive steps or how much resource is needed. Ultimately what we want to do is add a bit more science to the art of winter maintenance.

Enter some technology we have implemented to support our decision making.
These mobile temperature sensors, from Norwegian company Teconer, were successfully trialed in 2016.
The sensor unit mounts to the vehicle body and is capable of recording both air and road surface temperature.
The sensors connect via blue tooth to a mobile phone allowing the operators to view the temperature readings in the truck cab.
Readings are approximately every 1 second and are continuously transmitted from the cell phone out to a web server.
Last year MetService also undertook extensive analysis and testing of a number of different devices from around the world and determined the Teconer sensors used by us were in fact reliable, robust devices and are now planning to implement them across the country for the Agency.
In 2017, FH are running around 16 of these sensors across the South Island.

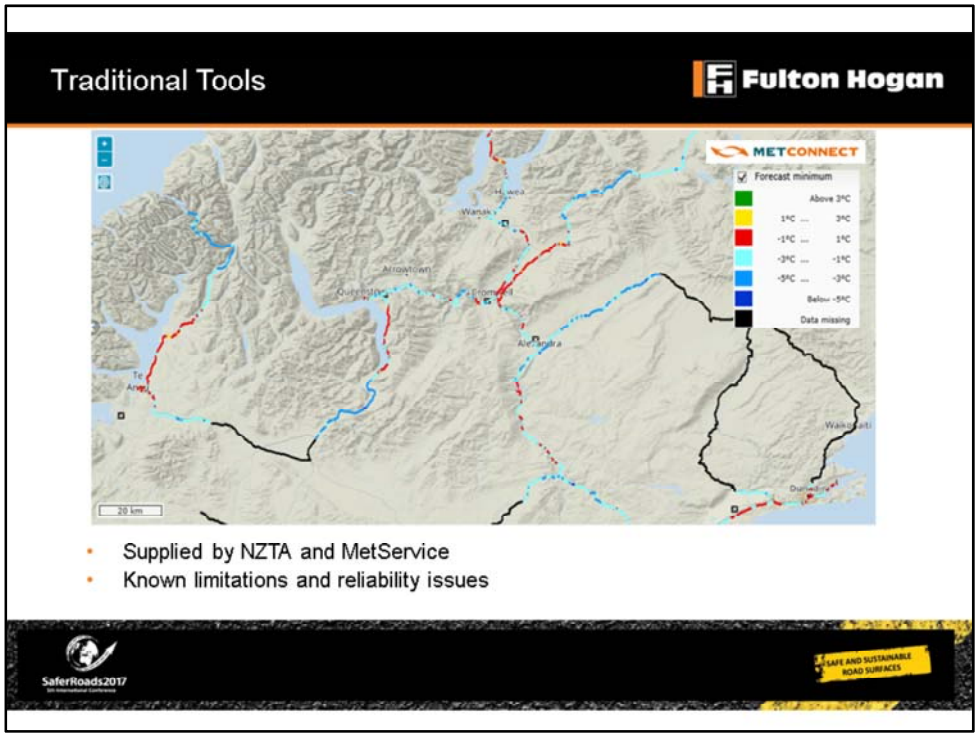
The benefits of Data Visibility for Operators includes

•Being able to easily identify cold areas for ice development

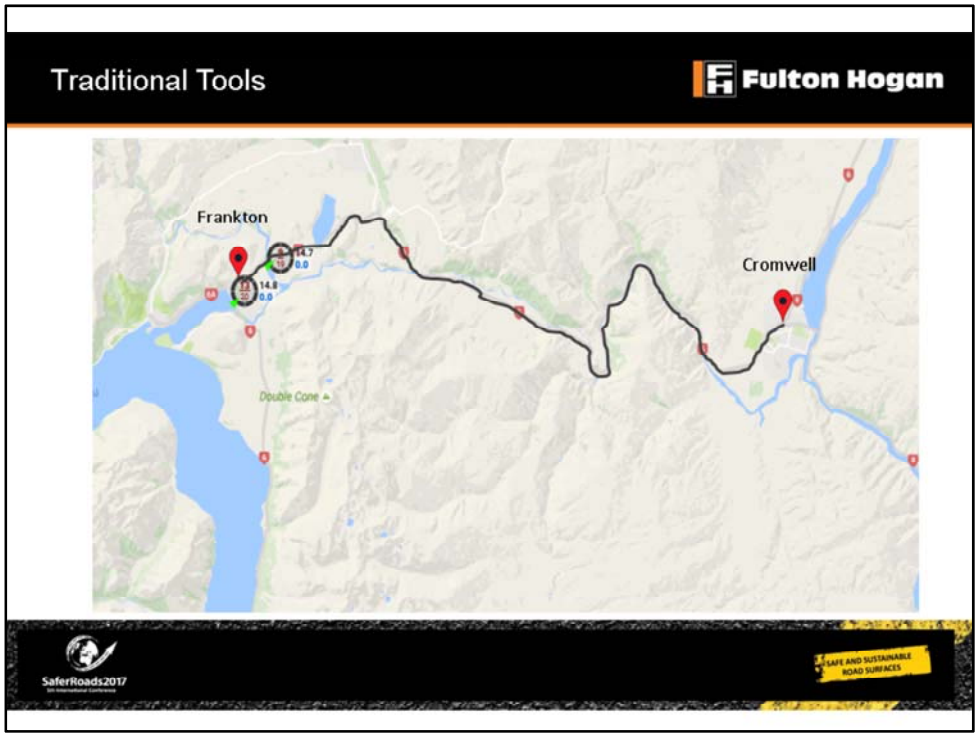
•Developing a better understanding of temperature relationships and how conditions on the road can change with weather changes



The live data-feed is then visible for any office based manager or client to view on their computer.
Different temperatures are displayed on a heat map with blue below zero, through to read above zero.
By clicking on the map at any point, the road and air temperature can be seen with the time of the reading.
One other great feature of this system is the photos. The mobile phone app allows photos to be taken at pre-defined intervals, say 20 sec or 2 minutes, which then appear on the map with the camera icon. By clicking on the icon, the photo comes up.
This is fantastic for clearly showing people back in the office what actual conditions on the road are like. These pictures become very important when using social media and other can communication channels to inform road users what conditions they can expect - which was a critical component of the safe road use pillar.

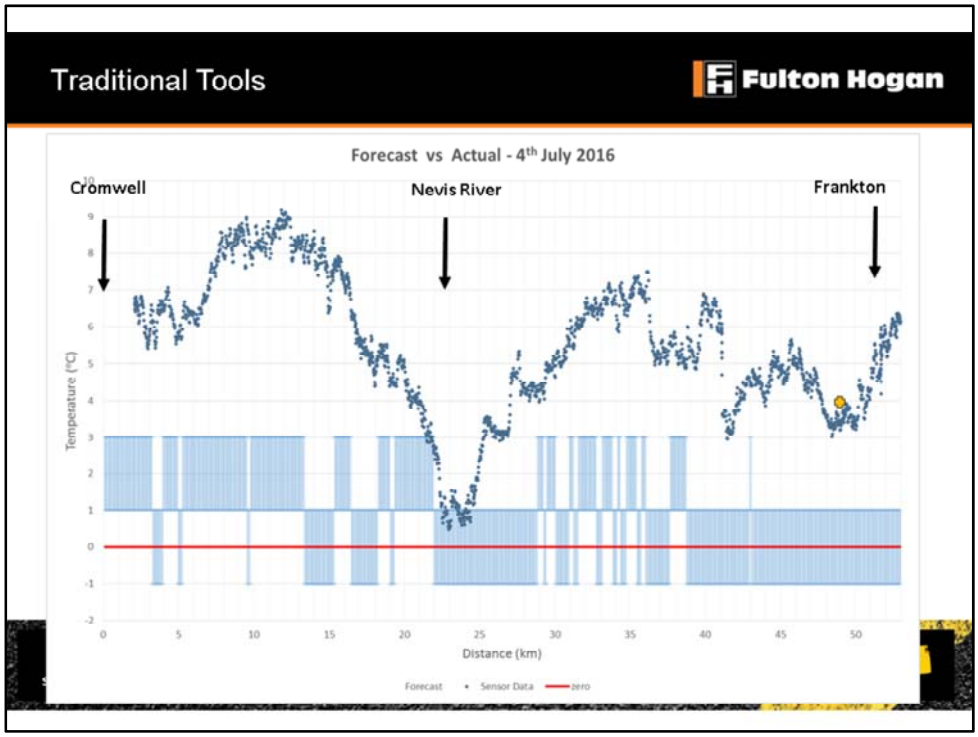


One of the other tools used is thermal mapping or road surface temperature forecasts. Many of you may be familiar with these maps produced daily by MetService.
Last year we did some analysis on the then current thermal mapping outputs using mobile sensor data to try and establish how accurate and reliable they were. This was in response to feedback from some operators that they didn't trust the mapping.

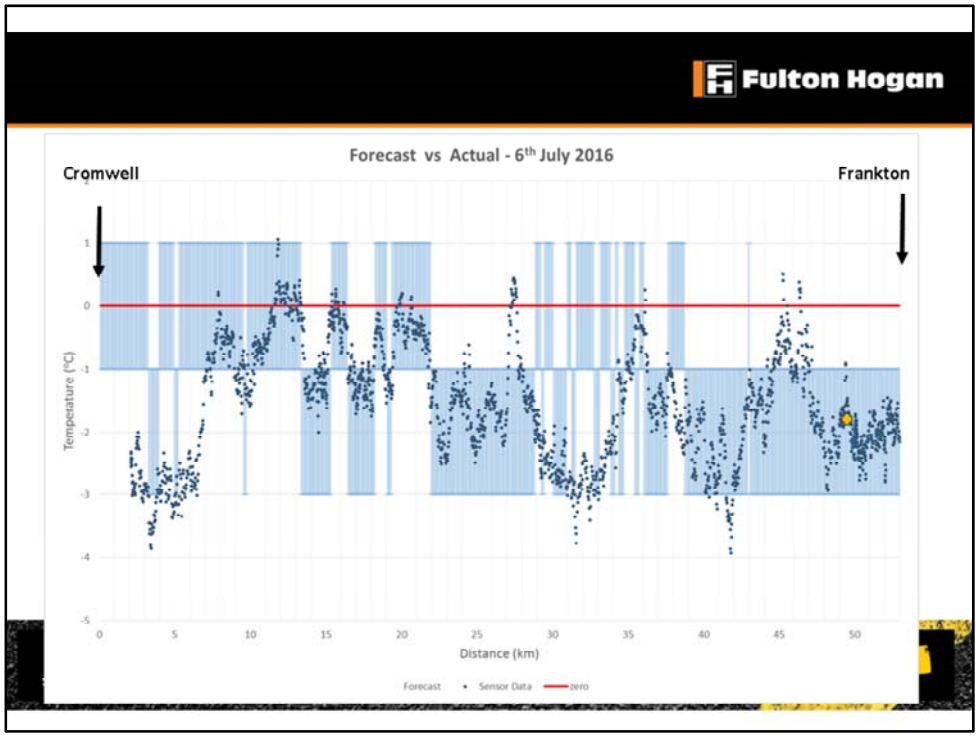


So we took a sample of the Central Otago network through the Kawara Gorge between Cromwell and Queenstown on SH 6. This is a known trouble spot for ice and we had good coverage from the mobile sensors

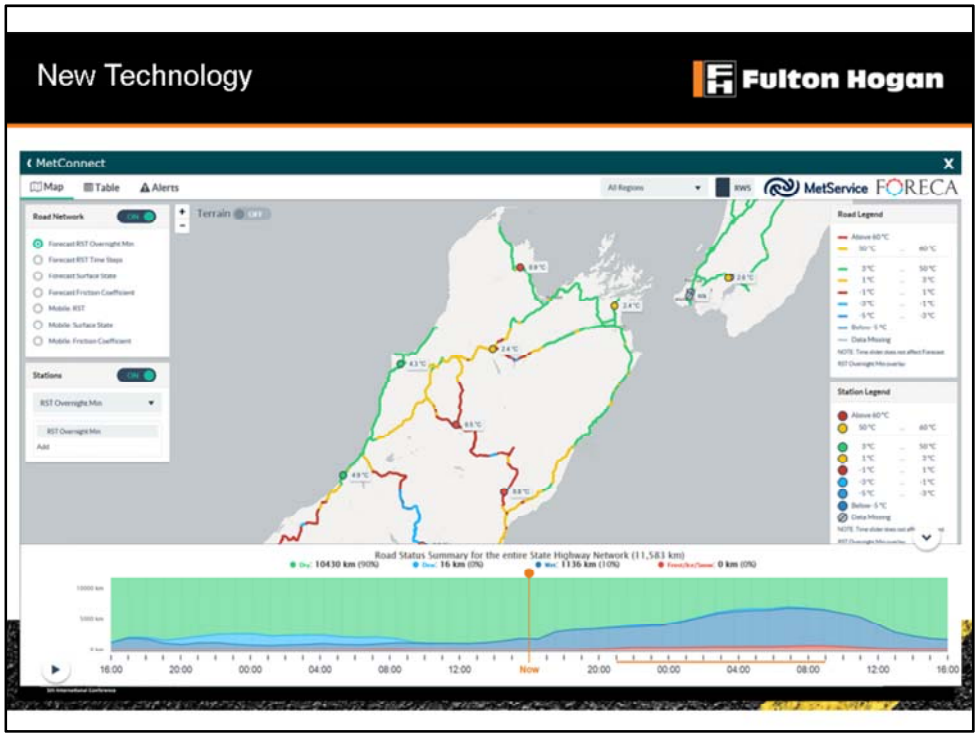
For the period of a week, I took the thermal mapping forecast and plotted the temperature bands along the length of road. On top of this I have plotted mobile sensor readings from the corresponding day.



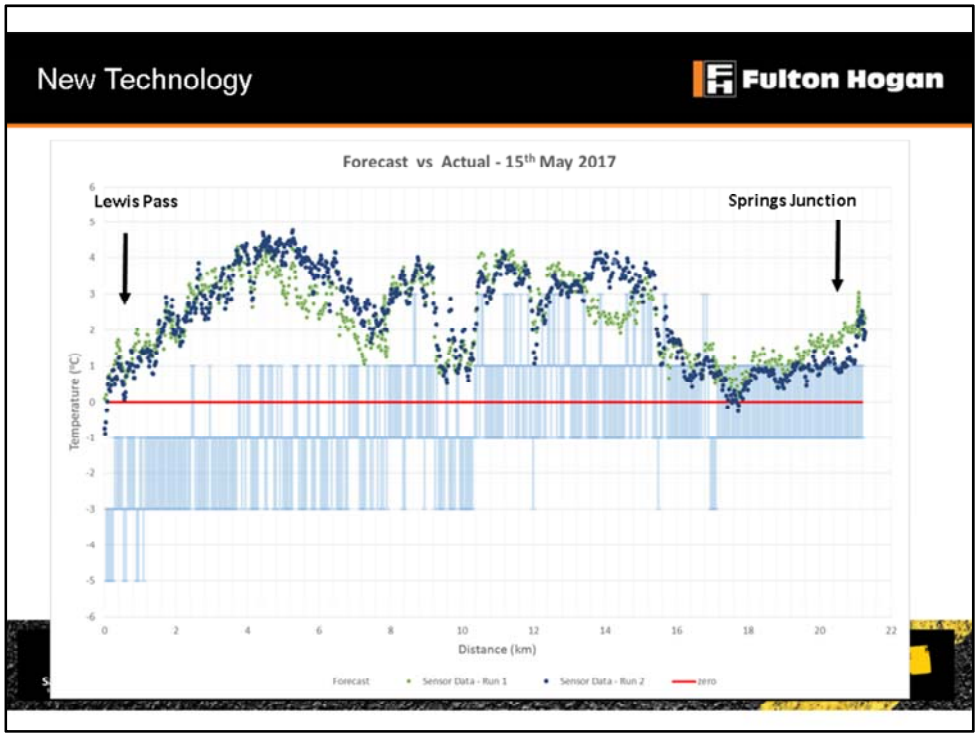
Just a couple of graphs to demonstrate the findings…
From day 1 - generally a lot warmer than forecast but one ‘problem area’ was correctly indicated



From the 3rd day – better alignment between forecast and actual. Interesting to note some areas are very reliable. Others have significant variance.
Generally the analysis indicated to us that the information needed to be taken in context and applied accordingly.



Since then, MetService have rolled out at the start of this month, a new road surface forecasting model in partnership with Norwegan company Foreca.
This tool not only forecasts the surface temperature but also provides a condition state forecast i.e. whether the surface will be wet, dry, icy, slush etc.
It is obviously early days for the use of this additional information and I believe there is a way to go for the industry to understand and utilize this information in the best way possible



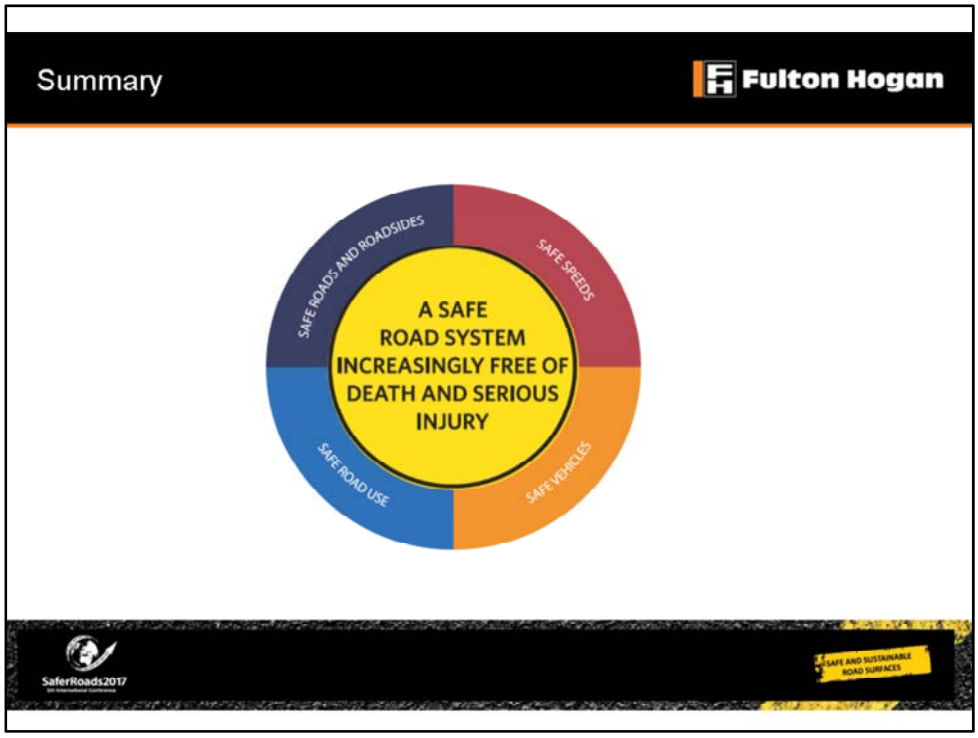
Again, it is very early days with the roll-out of this new product, and also early days of winter, but I have done similar analysis to look at the forecast compared to the actual mobile sensor temperatures.

This section is from Lewis pass to Springs junction on SH7 at 6am on Monday last week. To me, this is promising. Although the forecast is saying the road will get colder than what it actually did, the specific cold locations and warmer locations seem to be quite well represented.

The real beauty of this new system is it will actually utilize data from the Mobile sensors and 'learn'. The thousands of data points collected across the south Island by FH crews is feeding into the model and will help to make it more accurate and reliable over time.

A more reliable forecast enables the work crews to respond to the right places at the right time to keep the road safe with either CMA or ice grit.

To supplement the forecasting and also provide more real-time information, on the Alternate Route, two new weather stations have been installed - at Lewis pass and St Arnaud.
New satellite communication technology has enabled these stations to be positioned in weather critical areas were previously stations were sited only in locations where cellular coverage was present and not necessarily the worst winter sites.



To close, I wanted to come back to the pillars of the safe system.
In the Winter maintenance field, as with any other, it is critical for everyone to work across all areas.
I think the mobile sensors are a fantastic example of how big data is being used to improve road safety in a practical way.
The two key areas I covered today -
On the SH network, developments in technology are providing information which is helping crews on the ground maintain a safe road surface for winter driving. In addition, technology is enabling reliable condition information to quickly get back to the road user to educate, inform and prepare them for winter driving.

Questions

Fulton Hogan


Fulton Hogan
Safety in Winter Maintenance
Adam Humphries
0272004760
Alternate Route Asset Manager, NCTIR
SaferRoads2017
SAFE AND SUSTAINABLE ROAD SURFACES