



### **Background and Introduction**

When I started in the industry some 40+ years ago I remember looking up to the people that I considered at the time to be the grandfathers of traffic based on their knowledge and time in the industry, many of them have appeared on the JCT stage, but most of whom have now long since retired. Someone recently suggested to me that given my time in the industry perhaps I qualify as one now myself! A sobering thought!

As many of you will probably be aware the permanent and the temporary traffic signals worlds are two historically very different places, in the suppliers, in the technology and in the people, I think one of the only times they came close together was at exhibitions and conferences like the JCT one!

My recent move from the permanent to the temporary signal's world, 'the other side', I confess is both very interesting, and exciting, particularly given the timing. As the transportation and ITS world moves towards a Connected, Cooperative and Autonomous future it will undoubtedly throw up some very interesting challenges to the industry and to end to my career on, just in time for me to give up on my steering wheel, and an accelerator and retire into my autonomous pod... maybe!

This paper is very likely to raise more questions than it will provide answers, I certainly don't have all the answers, but between us, and as an industry, we will somehow need to sort it out...

### **Let's look at some of the History**

Whilst in the past the operation and functionality of early permanent traffic signals was pretty basic, there was, and still is, a lot of complexity in a traffic signal controller that is related to the operational safety. In the main these early traffic controllers consisted of relays, to switch signals, and fairly crude timing circuits. This meant that the required safety considerations to ensure that conflicting signals were not shown to drivers was in some respects a lot easier to achieve and was commonly resolved by the use of simple to understand and test, mechanical and electrical interlocking.

Most of the early traffic signal controller developments and specifications focused on the permanent traffic signals, concentrating on how they should look and operate safely under all conditions. At this time there seemed to be little real interest in any form of traffic control for temporary and road works situations, which at worst meant cars and pedestrians were left to fend for themselves around some cones and barriers, and at best meant you might find some 'Stop / Go' boards in use at peak times.

With the passing of time the design and capabilities of permanent traffic signals started to get more and more complex. This significantly increased pressure on both hardware and software designs to ensure that only safe combinations of signals are shown under ALL circumstances. This included both normal and fault conditions, as well as ensuring that the timings of the sequence were kept safe under all conditions. So as a part of the 'safety' design all the failure modes and faults that could occur had to be considered, this is not an easy or simple task when it comes to the complexities available with the more modern electronics and software!

As the temporary signals started to emerge and become commonplace they were often still very basic in their operation and tended to come from very different suppliers than those of permanent signals. There was generally little or no technology sharing or cross-over with the established permanent traffic signals world. As time went on, then came the first of what we see as the current generation of portable / temporary traffic signals to arrive on the streets. SRL were one of the pioneers for change in this space, with both the use of proven LED signal technology from the permanent traffic signals world, radio linking to simplify installation and remove the potential trip hazard of cables, and SRL were the first to introduce the portable pedestrian signals that are commonplace today.



### **What are the benefits of 'Narrowing the Divide'**

So today there is generally still a significant 'divide' between the permanent and temporary traffic signal worlds. Very different products, different specifications, and different suppliers. Also, when temporary and portables installations are deployed, they can often interfere with planned traffic flow and coordination provided by permanent traffic controllers and the associated ITS Systems in operation in the area, sometimes causing significant issues, including impacting on optimised progression methods (SCOOT etc) deployed on the road networks. So, as a result temporary traffic signals have and still tend to often be seen by many as a necessary evil.

Some work is currently being done on convergence of relevant specifications, temporary, portable and haul route (new TOPAS 2540). But there is still no real convergence with the permanent signal's specifications (TOPAS 2500), and as such there are still some differences around operation, control, and interaction that are impacting the narrowing of the divide between the two worlds.

There is however some take up of control and monitoring techniques from the permanent traffic signals world. Mainly through necessity, consideration is being given, and integration is happening in some areas of temporary and permanent traffic control, due in the main to the complexity, needs, and the potential length of some roadworks schemes.

This is resulting in technology such as SRL Urban 64 is being specified by the more and more clients to maintain a degree of coordination and consistent operation on larger longer-term schemes. Again, SRL pioneered a game changer of putting cables above the site (using 7-metre-high poles), with all the benefits and flexibility that brings, including positioning flexibility and less obstructive to the ongoing main ground works, and in some cases with the added advantage of mimicking final scheme early in the works schedule, to the benefit of road users and pedestrians alike. It also allowed the inclusion of features such as UTMC, MOVA and advanced detection techniques on these schemes, bringing with it the additional benefits in control and monitoring and operational efficiency that these facilities bring.





It should be noted that there is a significant number of portable and temporary signals that are put out, removed, and put out somewhere else, continually each year. It has been suggested that there are typically 5000 sets of portable or temporary signals out at any one time on the UK's roads. Given that these sets are frequently moved around, it's likely that total number of temporary sites deployed each year is very significant when compared against the total population of permanent traffic controllers.



This needs to be realised, understood, and fully considered as a part of the future of our Connected, Cooperative and Autonomous vehicle strategy.

Advanced Detection Systems such as SRL's ADS system are becoming available for portable and temporary traffic control minimising the unbalanced queuing issues seen at these sites and the impact on adjacent signals and junctions of these historically quite dumb deployments.



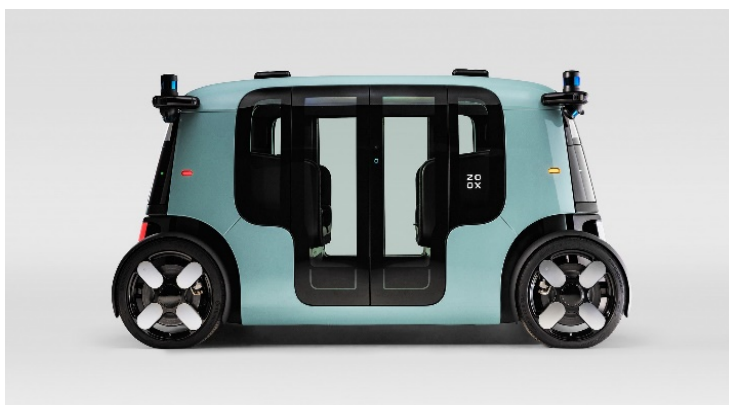
UMTC and MOVA capability is now also available to some portable and temporary traffic signals, allowing elements of monitoring, control and coordination that wasn't previously available. As is the connectivity to the Mobile / Temporary VMS units that are now becoming capable of being connected to an ITS system.

Major road schemes such as HS2 are looking for sophisticated 'Haul Route' crossing capabilities including linked traffic signal control, barriers, CCTV, and extensive control, monitoring as well as safety and security features.



### So where is it all going in the future and what are the challenges

So are the portable and temporary deployments traffic signal control deployments really an edge case



when it comes to the future or are they a real problem. As mentioned previously some of the biggest future challenges are likely to be when it comes to temporary and portable signals and Connected, Cooperative and Autonomous vehicles. How will these vehicles know that they are there, and will the vehicle be able to deal with them reactively, will they be happy to drive on the wrong side of

the road based on seeing or sensing what it believed to be a temporary green light to say it could?

All deployed portable traffic management (and traffic signals) assets will ideally need to be added to the 'live' signal's asset base including location and operation for the duration of their deployment so that vehicles of the future can get the required data for both operation and awareness of their presence. To some extent the deployment of temporary or portable mobile signage and VMS will also need to be considered, as it is assumed that at some point future vehicles will need to be aware of and potentially act on the messages displayed on these signs.

We will also need to be aware of, and take account of, the fact that different operating modes of temporary and portable signals, will bring different issues when it comes to vehicles of the future being able to understand their operation and deal with them correctly, efficiently, and most importantly safely.

So, some final thoughts and questions:

- It maybe that the capabilities of the different types of temporary and portable signals and any advanced detection capabilities need to be made available, to allow them to be included in control systems and future 'live' microsimulations and models.
- Maybe we should consider some sort of possible 'Beacon' type messaging from portables and temporary signals and even VMS to allow vehicles and systems to know that they are there and what state they are in or messages they are showing.
- Should portable and temporary signals be passing modes of operation and time to green etc to the main ITS systems or future systems for re-transmission to vehicles. ARTSM WG4 & TTF are already working on a unique site numbering system to include temporary sites to pave the way for this.
- Is there likely to be a lack of predictability with the increased use of more intelligent detectors and their integration into control strategies, such as the complexities and the lack of predictability that we already see on a MOVA junctions, and how will we deal with this.

We will need, at very least, to advise the future vehicles of the presence and mode of operation of temporary signals. As mentioned maybe these portable and temporary signals should broadcast and say, 'I am here' and possibly provide SPAT / GLOSA info directly, but this is a little way away and will almost certainly need some further joined up thinking.

## So, in summary

### What is meant by the concept of 'Narrowing the Divide'

- Some commonality is needed in the operation, control, and monitoring of the temporary and permanent traffic signal worlds to allow the coordination, control, and dissemination of the information to vehicles of the future. **Is this vehicle on the road or the pavement, or both?**



### What are the benefits of 'Narrowing the Divide' and bringing the two traffic worlds together?

- It hopefully brings some 'joined up' thinking and approaches to the problems that will be needed to be resolved as we move into a more Connected, Cooperative and Autonomous future. **How does this little guy press the button to cross the road?**



### So where is it all going in the future, and what are the likely challenges

- Some of the biggest challenges are likely to be around connected and autonomous vehicles not only being aware of and dealing with (under all circumstances) the permanent traffic signals, but just as importantly the regular coming and going, and the different modes of operation of the temporary and portable ones. **Maybe if we leave it for a while this will solve all of our problems...**



Kevin Gilday – Narrowing the Divide – JCT Paper 2021

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