Raw Output

Requirements were gathered by asking users what they want from a fully developed system (not just the prototype) within four areas:

- Use cases
- Functionality
- Metrics
- Visualisations / Outcomes











Methodology

Following the workshop, ideas were digitised and subcategorised in order to identify general themes for the requirements.

In total 171 requirements were categorised. These were then attributed to a total of 34 subcategories over the four main category areas (Use cases, Functionality, Metrics, Visualisation / Outcomes).

The following eight slides documents this subcategorisation. For each area, a summary of the number of requirements by each subcategory is also presented.





Use Cases

A recurring requirement was being able to test the impact of not only planned disruption but also unplanned disruption on the network. Also prominent was the a desire to understand behavioural change in response to disruption and multi-modal impacts.

Visualisations /

outcomes, 27

Metrics. 52



Functionalities, 25

Functionalities





Functionalities

The largest sub-category of functionality is around the need for the simulation tool to assess transport users response to the onset of congestion. Much discussion was also had on the need for this response to be understood across diverse segments within the population.

Visualisations /

outcomes, 27

Metrics.

52



25

Change in travel times

Speed (link-by-link)



Delay (link by link)
Traffic volume and class (link by link)

Frequency and severity of slip road blocking back on the motorway mainline

Delays to local bus users resulting from re-routing of traffic off the long distance road network

Vehicle time spent stationary / near stationary (<5mph) by vehicle type

Queue lengths and their duration (minutes, hours, days)

Time delays (by day, time of day / night)

Door-to-door travel time variability e.g. mean vs 85th percentile

Generalised journey time by user (car, PT)

User class delays

Vehicle kilometres

% reduction in traffic

Reduction in queue length / delay

Impact on bus journey times

Traffic flows Travel times Congestion and Delays

Average speeds

Vehicle delay with constraint (works) without re-routing

Vehicle delay with constraint (works) with re-routing

Journey time improvements by user class

Rank the worst affected roads and time / dates

Flow of people through an area

Vulnerability metric - how sensitive is the network to disruption

Journey times from A to B - stability and reliability

Metric relevant to segment e.g. speed of journey

Compensation calculation - what does it cost to individuals / businesses

Journey delay (i.e. expected vs actual)

Journey reliability (by link)

Journey time variability

Flow of people through highway not just vehicles

Maximum queue times on the strategic network



Probability of disruption due to unplanned incidents





Visualisations / Outcomes





Visualisations / **Outcomes**

The was a strong theme of needing a tool which promotes collaboration and communication and using visual techniques such as map based views of information.

Other, 4



Graphics, 2 Calibration & validation, 3 Collaboration & communication, 11 Map based, 7



Agile Development

evelop

Now that the initial set of requirements have been **discovered**, a set of user stories and outline acceptance criteria are identified to bound the development of the prototype simulation and visualisation. This is part of the **Define** phase of the work package.

These user stories are shown on the following four slides and have been split into areas of development (known as **epics**) for the software development to focus on. *Disc*

Define

These user stories are a subset of those needed to be met for a fully built out system and represent those that may be prioritised for delivery in the prototype.



No.	Epic	User story	Acceptance criteria				
1	Configuration / Inputs	As a user, I want to be able to configure scenarios with different traffic management associated with planned works easily, so that I can test different roadworks schedules in combination	- Web based configuration tab allowing users to change different simulation parameters associated with planned works and the associated traffic management measures (e.g. lane closures, speed limit changes)				
2	Configuration / Inputs	As a user, I want to be able to configure scenarios to include the occurrence of unplanned incidents, so that I can test how vulnerable the road network is to unplanned incidents	 Option in configurator to include the chance of unplanned disruption Ability to adjust accident rates on different roads and the capacity reduction they cause 				
3	Configuration / Inputs	As a user, I want to be able to configure scenarios to change trip making assumptions at "persona" level (such as x% of individuals with a certain characteristic working at home), so that I can understand what targets to set for travel demand management campaigns	- Web based configuration tab allowing users to change trip making behaviour for different personas in the population				
4	Configuration / Inputs As a user, I want to be able to configure scenarios to chan trip making assumptions at a geographical level, to understand what targeted travel demand management new to achieve		 Web based configuration tab allowing users to change trip making behaviour from and to different geographic areas List of geographies and the associated behaviour 				
5	Platform	As a user, I want to have an online dashboard where I can easily configure simulations, so that I can run simulations on demand from anywhere	- Web based configuration tab allowing simulation input parameters to be adjusted				



No.	Epic	User story	Acceptance criteria					
6	Platform	As a user, I want to have an online dashboard where I reconfigure previous simulations, so that I can quickly adjust scenario definitions and then re-run them from anywhere	 Web based tab allowing users to recall a simulation which then allows them to adjust input parameters and re-run simulations 					
7	Platform	As a user, I want to have an online dashboard where I can see a visualisation of simulation outcomes, so that I can easily see the impact of different simulated scenarios	 Web based dashboard displaying a number of maps and graphics which communicate the results of the simulation maps and graphics change in response to user interaction with different data filters, etc. 					
8	Platform	As a user, I want secure access to an online platform on behalf of my organisation, so that I can run simulations myself on demand without needing specialist software or hardware installations	- Online login screen, allowing users to login with a given username and password					
9	Scenario Management	As a user, I want to be able to see the impact of one scenario against another, so that I can determine which scenarios have the least impact	 Split screen display with the ability to see maps and graphs for each scenario Comparative metrics to show how much better or worse a scenario is 					
10	Scenario Management	As a user, I want to simulate the congestion impacts on the highway network resulting from planned and unplanned works / incidents, so that I can put an appropriate mitigation plan in place	 Simulation to allow infrastructure changes to be coded such as lane closures, speed limit changes, road closures etc. Simulation to allow specific list of traffic management to be included (planned works) Simulation to allow accident rates to be entered on the network in order to randomly invoke capacity reductions to simulate the effects of unplanned incidents 					



No.	Epic	User story	Acceptance criteria			
11	Scenario Management	As a user, I want to see how simulated congestion compares to observed conditions under prevailing conditions, so that I can gain confidence in the simulation's accuracy	 Results dashboard to include graphics and maps showing comparison of simulated outputs to observed metrics (such as traffic flows, speeds and journey times where available) 			
12	Study Area and Segmentation As a user, I want the simulation to have a high level of demand segmentation, so that I can determine the impacts of scenarios on different parts of the population		- Simulations to include a synthetic population with activity schedules in order that targeted behaviour at "persona" le can be input and results aggregated by chosen segment			
13	Study Area and Segmentation	As a user, I want the simulation to cover the strategic, key and local road network around the Birmingham box, so that I can test the impacts of interventions affecting this area	- Simulation coverage to include all roads bounded by the Birmingham Box motorway network			
14	Visualisation / Outputs	As a user, I want to be able to see journey times by road corridor on a map changing every five to fifteen simulated minute, so that I can see where congestion is	 Map view of network in results dashboard User can select different predefined routes and see how journey times change over duration of simulation 			
15	Visualisation / Outputs	As a user, I want to be able to see travel speeds by road segment on a map changing every five to fifteen simulated minute, so that I can see where congestion is	 Map view of network in results dashboard User see via thematic styling how link speeds change over the course of the simulation Slider to allow user to navigate through simulation time 			



No.	Epic	User story	Acceptance criteria
16	Visualisation / Outputs	As a user, I want to be able to see traffic flow and throughput every five to fifteen simulated minutes, so that I can see where congestion is	 Map view of network in results dashboard User see via thematic styling how traffic flow / throughput changes over the course of the simulation Slider to allow user to navigate through simulation time
17	Visualisation / Outputs	As a user, I want to be able to see a measure of journey time variability or reliability, so that I can see how variable or reliable network conditions are under different scenarios	 Map view of network in results dashboard User can select different predefined routes and see how journey time variance changes over the course of the simulation Reliability metric to be discussed but could be number of journeys completed within the 85th percentile journey time of the base scenario in order to show how much better or worse a scenario is
18	Visualisation / Outputs	As a user, I want to be able to see a KPI showing the overall stress of the road network, so I know how vulnerable it is under different scenarios	 Dashboard showing a panel of aggregate measures of network performance
19	Visualisation / Outputs	As a user, I want to be able to see a Gannt chart showing a programme of roadworks with KPI of network performance, so that I can optimise a works programme	- Gannt chart showing schedule of works with thematic styling to communicate network impact
20	Visualisation / Outputs	As a user, I want to be able to download simulation outputs, so that I can run my own analysis including an economic impact assessment	- Simulation manager tab includes a button which allows the user to download results from the simulation in tabular / csv format



Requirements / User Story Mapping

Following the definition of the prototype user stories, an assessment was conducted to estimate which of the 171 requirements gathered from the workshop are in some way met should these user stories be achieved. This assessment shows two thirds of the requirements have some relation to the user stories defined. This is graphically shown to the right with coloured squares representing that the requirement has a relation to the user stories.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
166	167	168	169	170	¹⁷¹ Immense									

Enabling Intelligent Mobility