

**MAGIC**

Envisaging a world with greener cities

*MAGIC PARTNERS MEETING*

*October 24, 2019*

**Taking MAGIC forward**  
*PARK: accelerating the Process for Accessing and  
using Research outputs & Knowledge*

**Mr. Nabeel Shaikh & Dr. Fabio Galatioto**

*Electronic Science and SATE Technology*

# Contents

- ***Who are we?***
  - *Electronic Science and SATE Technology*
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- ***How PARK concept benefits from MAGIC?***
- ***Next steps***



electronic  
SCIENCE



## A few of our capabilities

- User experience modelling
- Software application development
- Workflow analysis and application development
- Mobile application design and development
- Software security
- Software Systems analysis
- IOT application development
- Economics
- Statistical analysis
- Big data analytics
- Big Data, AI and ML
- Models & Simulations
- Economics

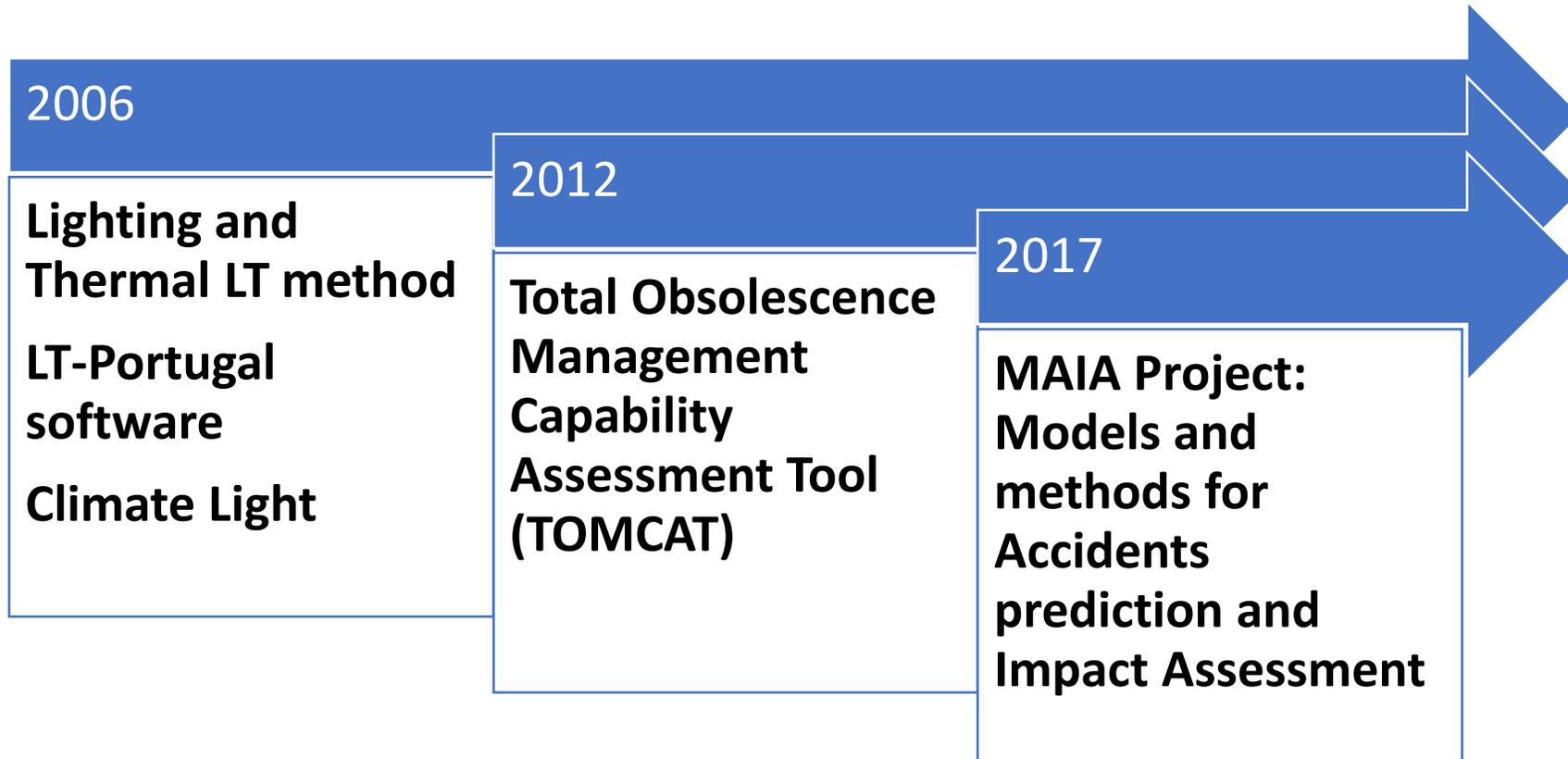
## Sectors

- Medical informatics
- Recruitment industry
- Education
- Computer gaming
- Health & wellbeing
- Social organisations
- Regulatory affairs
- Transportation
- Air quality & environment

## Products

- Hospital management systems
- University student on boarding systems
- Technology consultancy

# Examples of research outputs into usable product



# Lighting and Thermal LT method

## Main aim

LT-method is a practical tool to predict building energy demand based on the concept of passive zones. It could help inform knowledge about building energy performance at an early stage of design.

## Key outputs:

A manual method has been developed by Nick Baker and Koen Steemers, from the Martin Centre for Architectural and Urban studies, University of Cambridge, since 1988.

Important contributions to further revisions were also made by David Hoch, at the Martin Centre for Architectural and Urban Studies, University of Cambridge, and Cambridge architectural Research Ltd.

<https://www.sciencedirect.com/science/article/abs/pii/0378778895009507>

[http://www.esru.strath.ac.uk/Courseware/Design\\_tools/LT/fur\\_info.htm](http://www.esru.strath.ac.uk/Courseware/Design_tools/LT/fur_info.htm)



# The LT-Portugal software: a design tool for architects.

*A software implementation of the LT Method specifically customised for Portugal*

<http://www.irbnet.de/daten/iconda/CIB17395.pdf>



# The LT-Portugal software

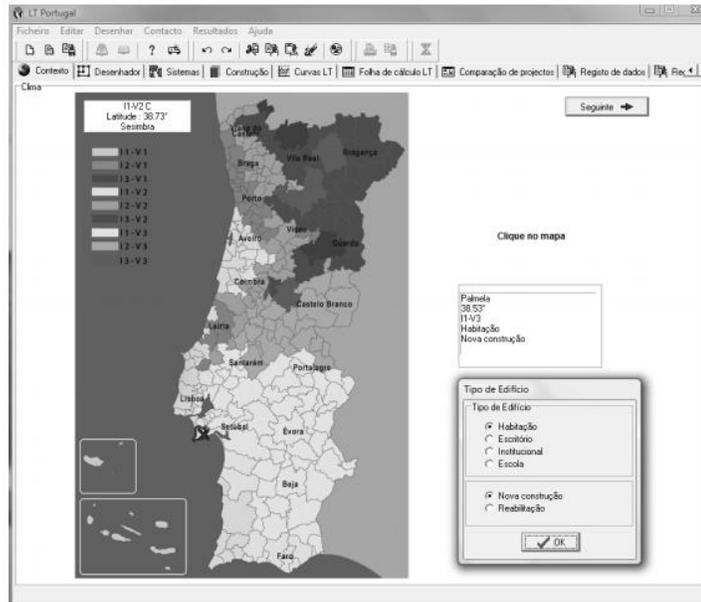


Figure 1: Input screen 1: Context.

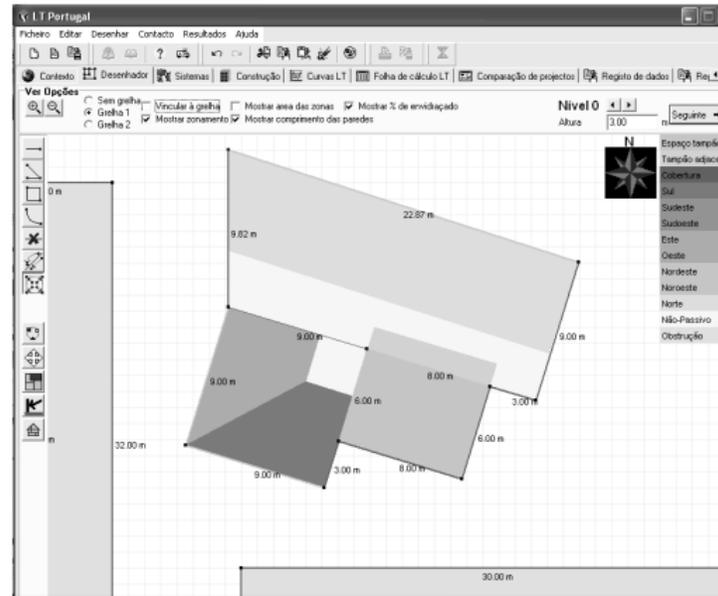


Figure 2: LT Sketcher screen

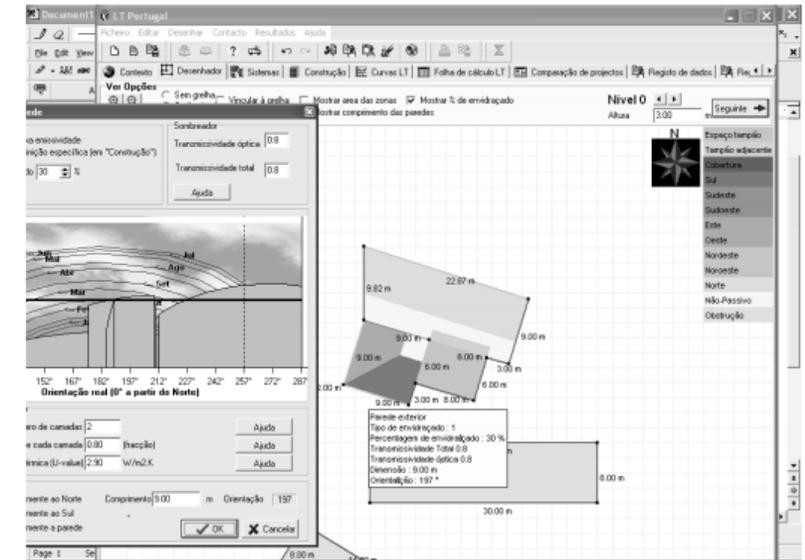


Figure 3: LT Sketcher screen showing plan of building with atrium [in blue] (green house or buffer space).

# ClimateLite

A software for design teams that works towards truly integrated low carbon design from initial design conception.

It is an iteration of the LT Software with the addition of features like Site Analysis, Carbon Mixer and Strategy Wizard

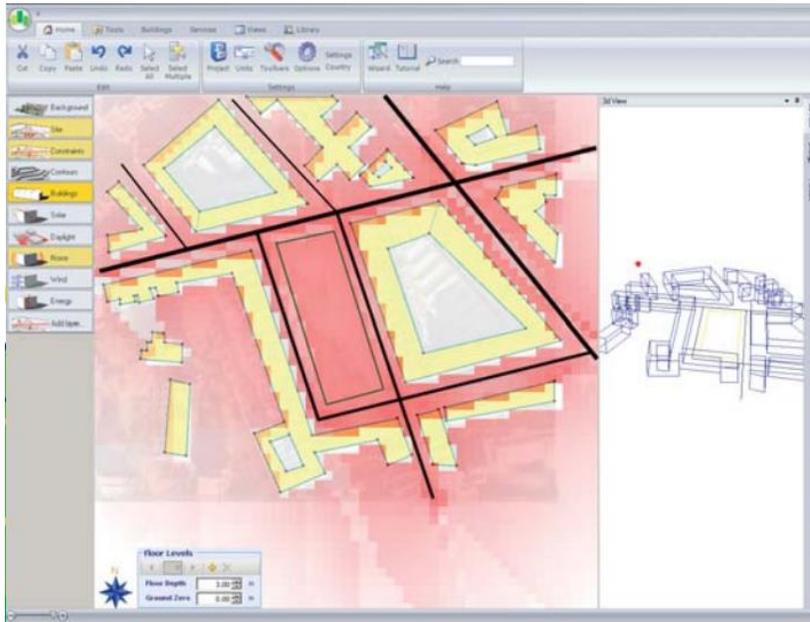


Figure 1: Highlight areas where there are acoustic challenges

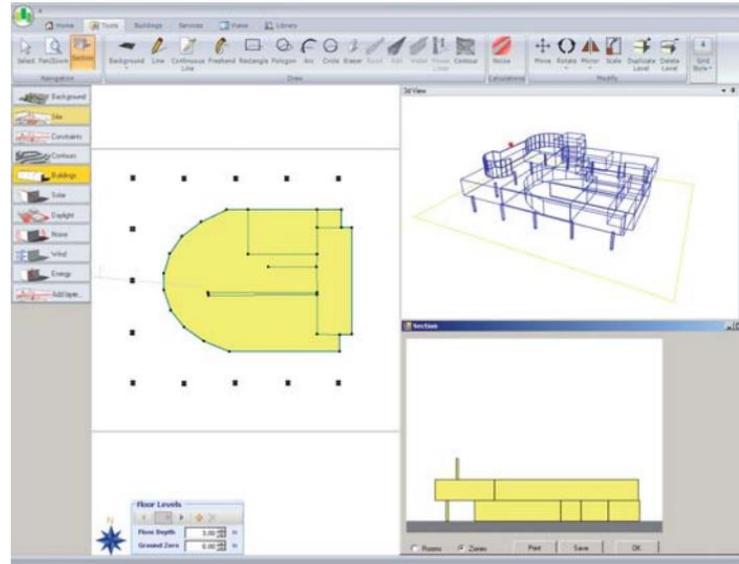


Figure 2: Energy and environmental performance (LT Method)

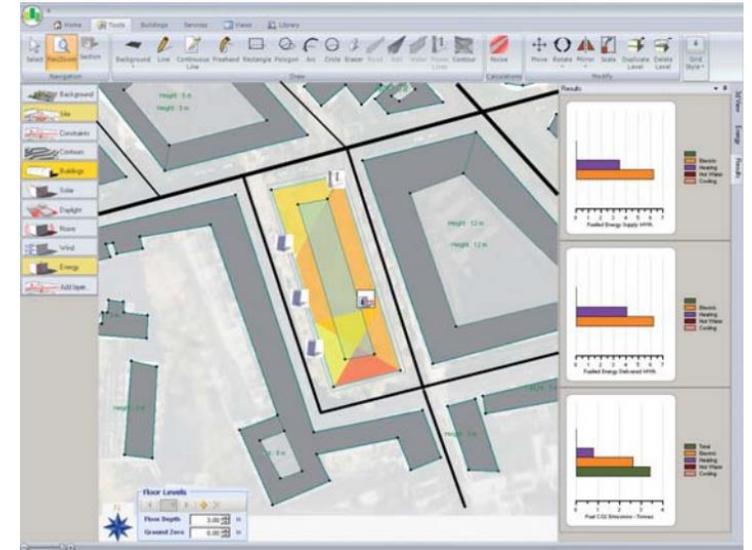


Figure 3: Strategise by considering the most appropriate mix of low-carbon energy technologies.

# Total Obsolescence Management Capability Assessment Tool (TOMCAT)

## Main aim

TOMCAT is a tool for contractors to perform self-assessment and for the MoD to set *obsolescence management capability improvement targets* to its suppliers.

**Key Outputs:** A web platform containing scoring scale for metrics and assessment results. The tool was developed by Cranfield University for and in collaboration with the Ministry of Defence.

[https://www.researchgate.net/publication/241779062\\_TO\\_MCAT\\_An\\_Obsolescence\\_Management\\_Capability\\_Assessment\\_Framework](https://www.researchgate.net/publication/241779062_TO_MCAT_An_Obsolescence_Management_Capability_Assessment_Framework)



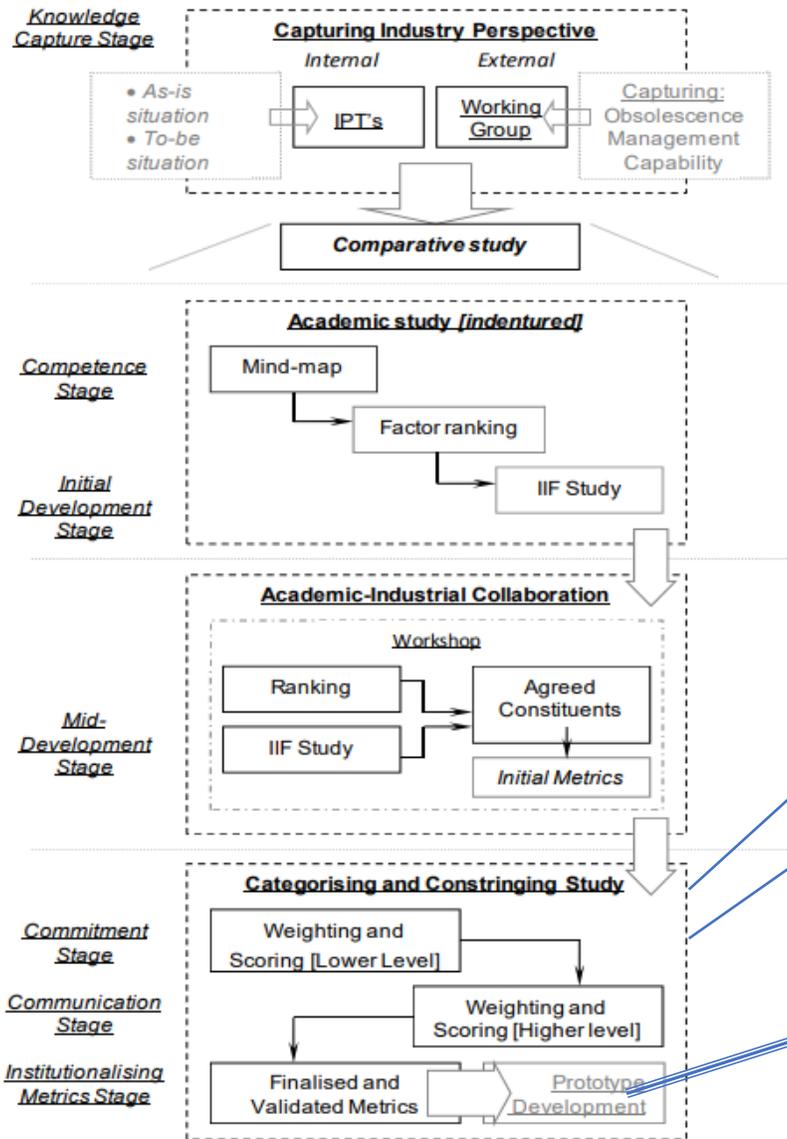


Figure 1. Research Methodology.

Not Defined 0 5 10 15 Partially Defined 20 25 30 35 40 Defined 45 50 55 60 65 Clearly Defined 70 75 80 85 90 95 100 Comprehensively Defined

Figure 2. Scoring Scale for Metrics.

Table 2. Number of Metrics per Activity.

Activities	Number of metrics
OM Governance	3
Supplier	3
Design for Obsolescence	4
Risk Assessment	5
Obsolescence Monitoring	3
Communication	4
Obsolescence Resolution Process	3
<b>Total</b>	<b>25</b>

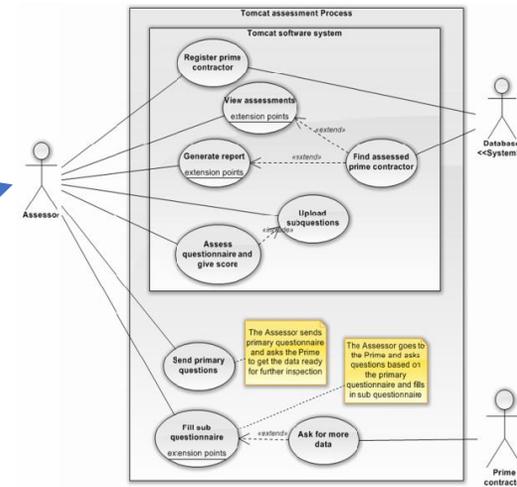


Figure 4. Unified Modelling Language (UML) Diagram of TOMCAT Process.

# TOMCAT

# Requirements analysis example

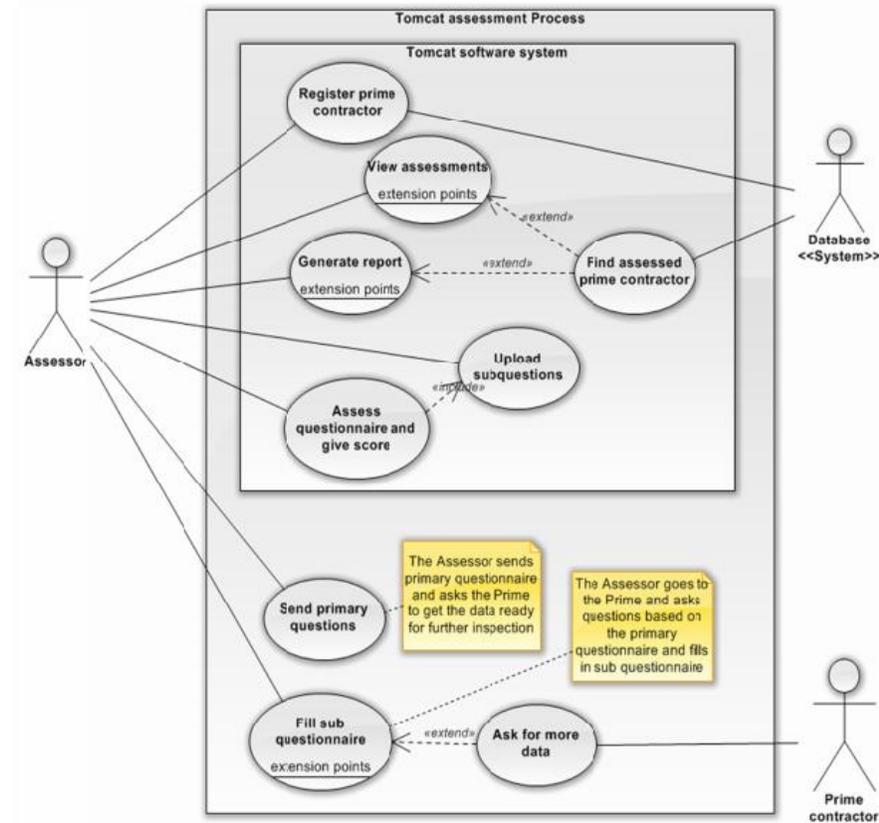


Figure 4. Unified Modelling Language (UML) Diagram of TOMCAT Process.

# TOMCAT web assessment platform

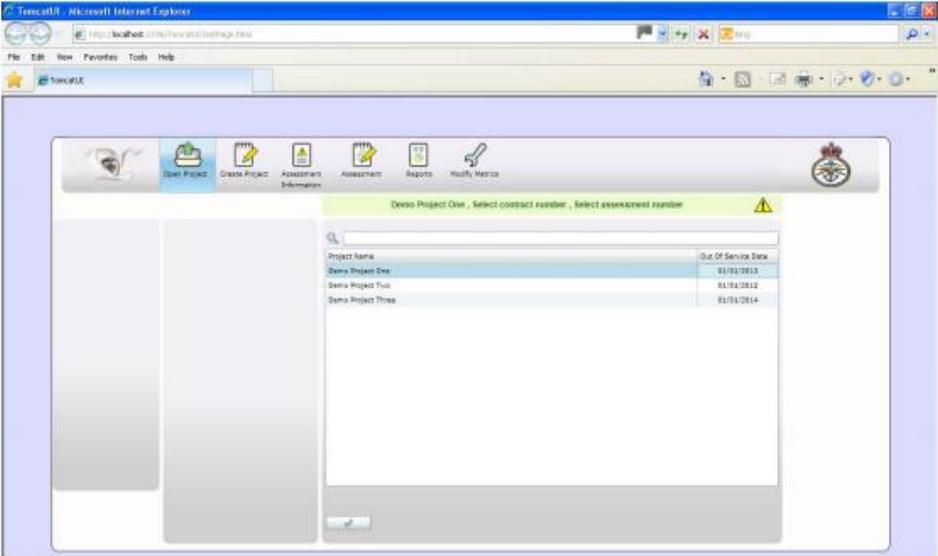


Figure 5. Snapshot of Assessment Creation in TOMCAT.

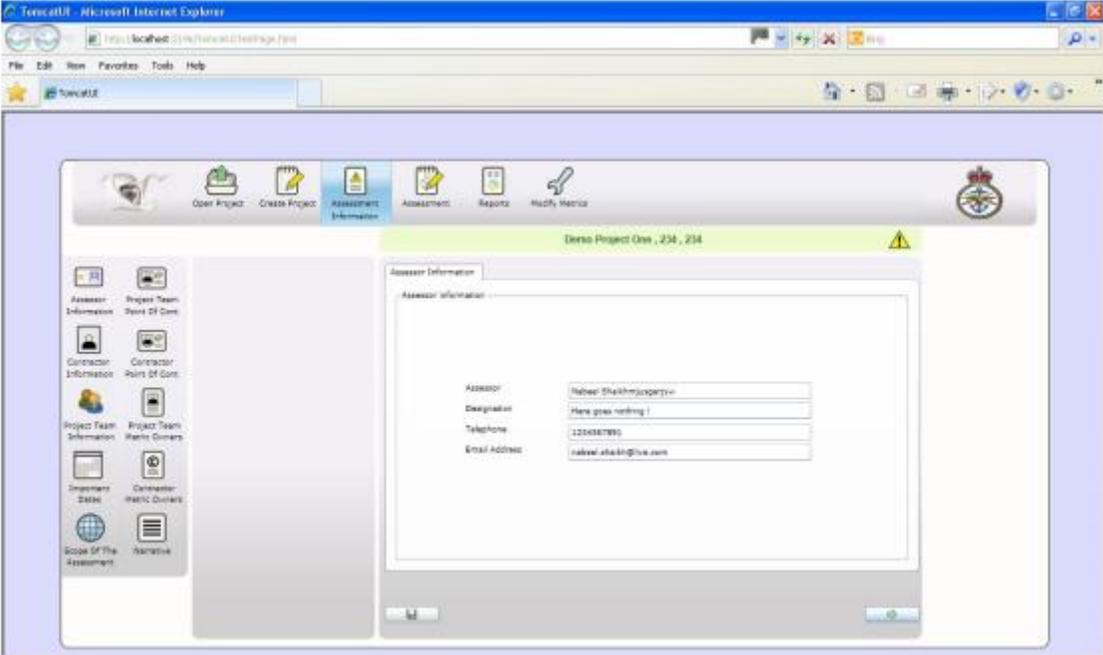


Figure 6. Snapshot of Assessment data input in TOMCAT.

# Assessment results

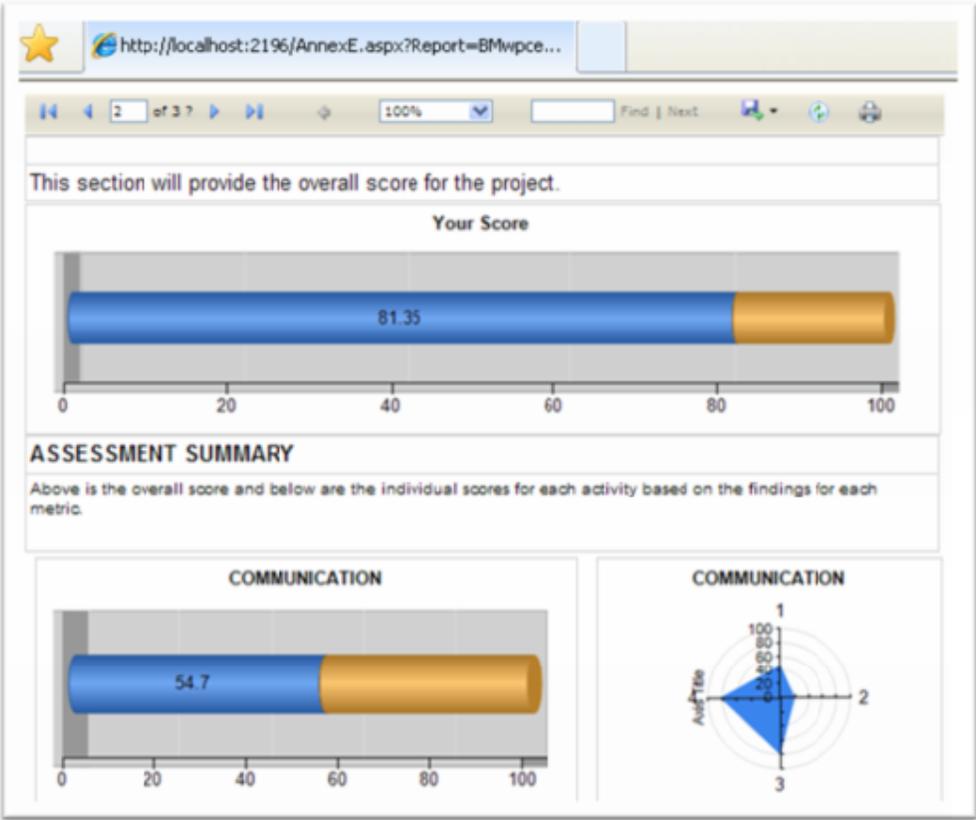


Figure 7. Snapshot of Assessment Report in TOMCAT.

# How it ends up being a product

The screenshot displays the website for the Through-life Engineering Services Centre. At the top left is the logo and name. On the top right, there are links for 'access sharepoint' and 'member login', and a search bar. A navigation menu below the header includes 'Consultancy', 'Work With Us', 'Courses', 'TES Conference', 'Downloads', and 'Contact Us'. The main content area features a title in orange: 'The Cranfield Manufacturing Consultancy delivers exceptional value for manufacturers and operators'. Below this is a paragraph explaining that TES maximises lifetime value and makes manufacturers more responsive. A bulleted list follows, listing benefits like reduced costs, agility, extended lifecycles, safety, and sustainability. Another paragraph states that the consultancy enables manufacturers to take advantage of TES by combining business expertise with Cranfield's research and education. A second bulleted list mentions transforming thinking and delivering specific improvements. At the bottom, a diagram shows a layered structure: 'Business Strategy and Change Management' at the top, followed by six boxes for 'Cost & Uncertainty Risk Management', 'Attribute Trade-off Modelling', 'Obsolescence Management', 'No Fault Found Self-Assessment & Benchmarking', 'Maintenance Analysis & No Fault Found Reduction', and 'Systems Engineering for TES'. Below these is 'Opportunity Monitoring' and 'Research and Education'. The footer contains logos for Rolls-Royce, BAE SYSTEMS, babcock (with the tagline 'trusted to deliver'), and BOMBARDIER.

Through-life Engineering Services Centre

access sharepoint | member login

Search... search

Consultancy | Work With Us | Courses | TES Conference | Downloads | Contact Us

## The Cranfield Manufacturing Consultancy delivers exceptional value for manufacturers and operators

Through-life Engineering Services (TES) maximise lifetime value for products, assets and infrastructure. TES make manufacturers more responsive and competitive, and give operators substantial savings and assured performance:

- Reduced costs
- Agility in production and ongoing operation
- Extended lifecycles
- Assured availability and safety
- Sustainable use and re-use

The Cranfield Manufacturing Consultancy enables manufacturers and operators to take advantage of the potential of TES. We combine expertise in business and change management with Cranfield's world class research and education capability to:

- Transform thinking and business practices needed to take advantage of the potential of TES; and
- Deliver specific TES improvements, targeting key opportunities.

Business Strategy and Change Management

Cost & Uncertainty Risk Management | Attribute Trade-off Modelling | Obsolescence Management | No Fault Found Self-Assessment & Benchmarking | Maintenance Analysis & No Fault Found Reduction | Systems Engineering for TES

Opportunity Monitoring

Research and Education

Rolls-Royce | BAE SYSTEMS | babcock trusted to deliver | BOMBARDIER

# MAIA Project: Models and methods for Accidents prediction and Impact Assessment

DfT funded project, 11 months, May 2017 – March 2018

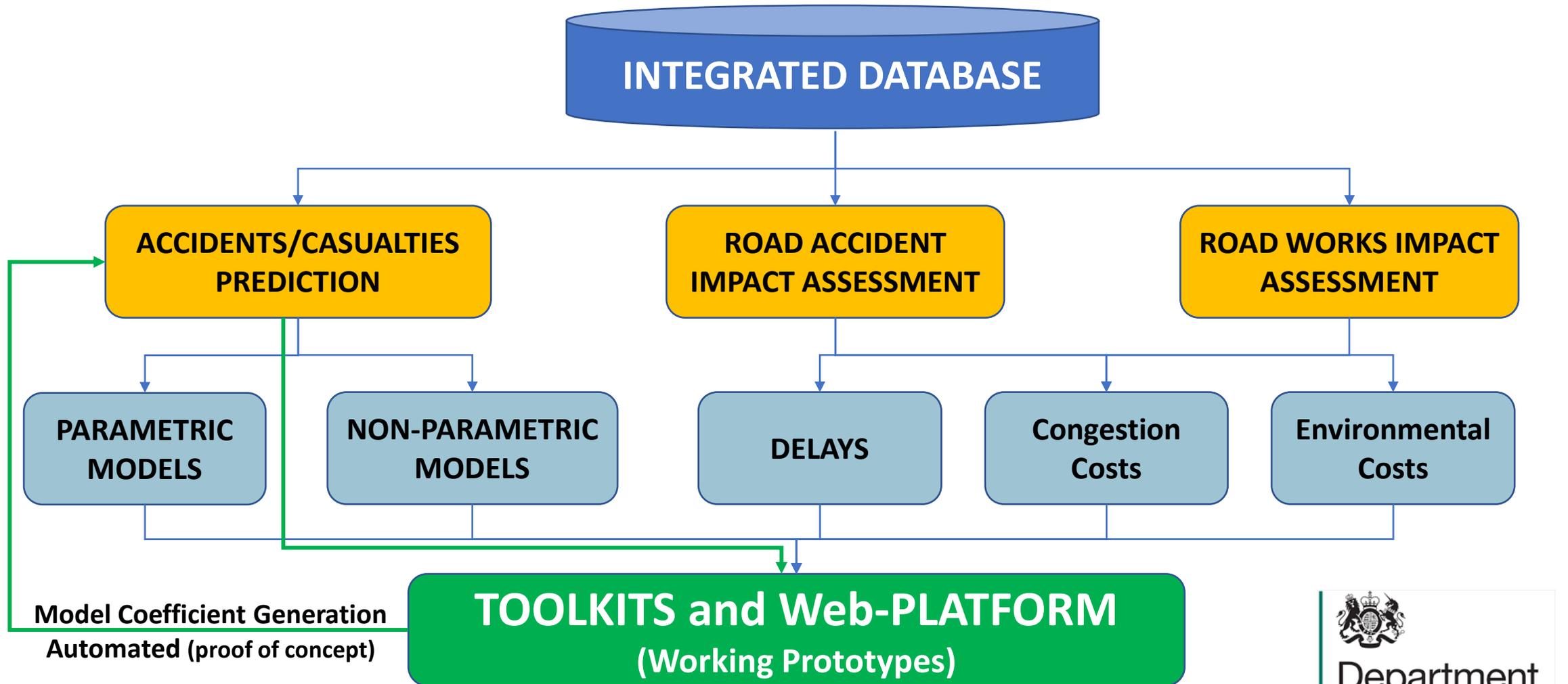
## Main Aim

To develop and test new techniques and tools to improve the way road collisions are predicted and related impacts estimated.

Key outputs: a proof-of-concept **web platform** for the analysis, and prediction of road collisions events, enabling **fast and robust models** to run and be **generated at national** as well as **local scale**.

An **Impact Assessment toolkit** using real-world data to understand impacts caused by road collisions and roadworks.

# MAIA Project Components



# Accident Prediction Models – best models so far

□ **32,844 records** of crash annual rates (LSOA) and related potential predictors analysed;

□ **1,780,653 records** of STATS19 data (2005-2015) analysed;

□ **More than 320 parametric** (microeconomic) **and non-parametric** (artificial neural networks and pools of artificial neural networks) developed and compared;

## Resolution

## Crash dimensions

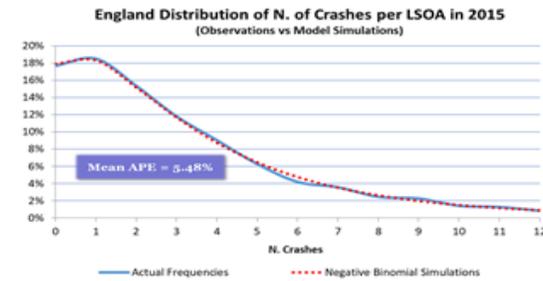
## Models

## Accuracy

LSOA scale

**N. of Crashes**

- Negative Binomial regression
- Ensembling (ANN)

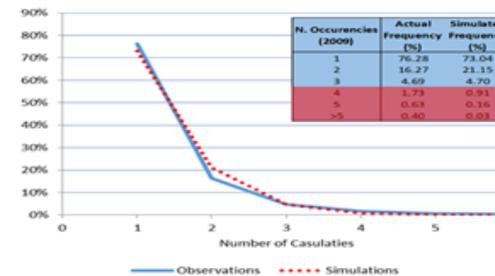


**ERROR from 2% to 12%**

Link/junction

**N. of Casualties**

- Poisson Regression
- Ensembling (ANN)

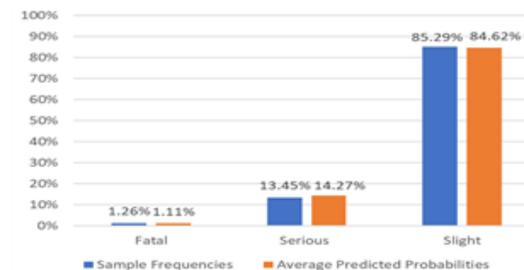


**ERROR 4% (30% for less frequent events)**

Link/junction

**Severity**

- Ordered Multinomial Probit/Logit Model
- Ensembling (ANN)



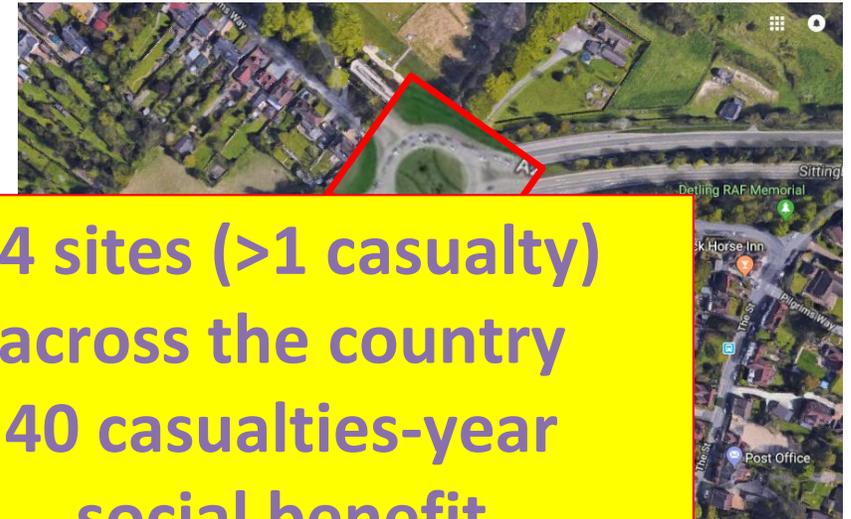
**ERROR 5% slight and 15% serious/fatal**

# Accident Prediction Models

## Planning Example



Distribution of the variables to the number of accidents per site  
 (160%)  
 Probability of a site to have more than one casualty



14 sites (>1 casualty) across the country  
 40 casualties-year  
 social benefit  
**£1.5m**

M			out
			Δ
Pr			-38%
Prob. [Acc. Sev. = Serious]	0.150	0.115	-24%
Prob. [Acc. Sev. = Slight]	0.839	0.878	+5%
Prob. [N. Casualties >1]	0.3808	0.2408	-37%

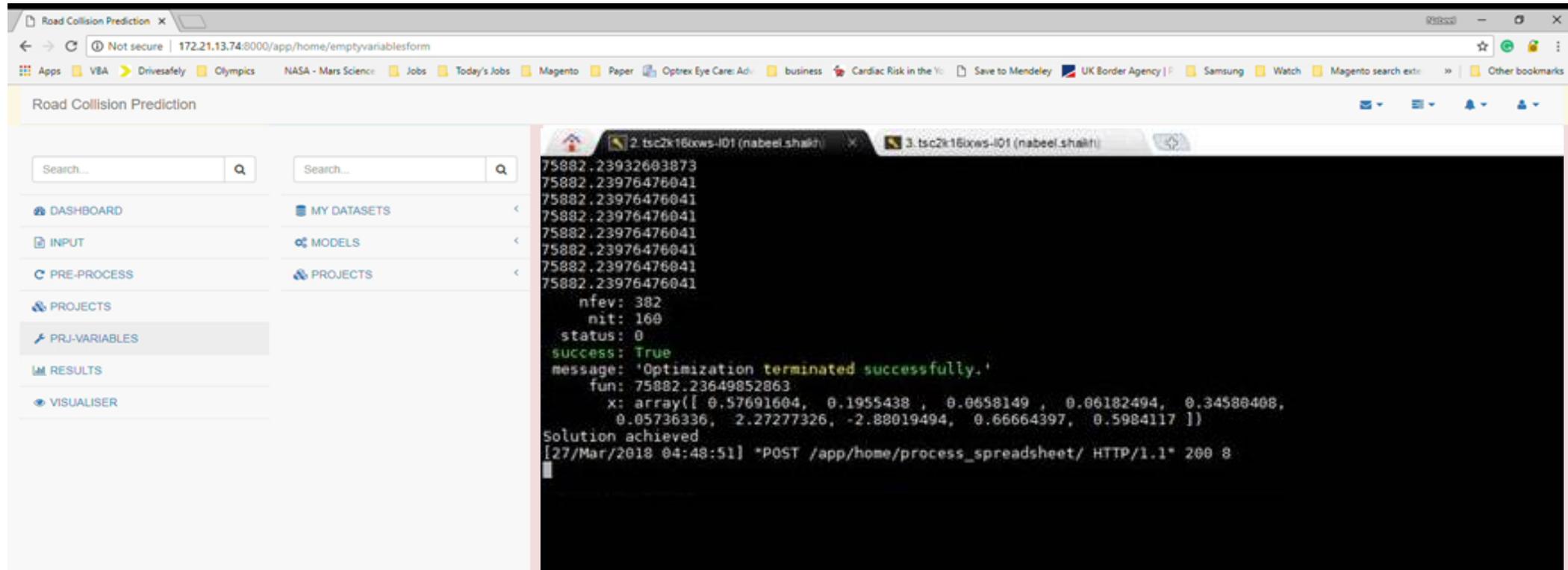
# Accident Prediction Toolkit (web-based)

1 minute exercise

VIDEO TO BE INCLUDED

CHANGING JUNCTION TYPE

- Ability to **update models' coefficients** over time and develop context-specific models (at Local Authority level or for those areas where collision phenomena follow anomalous patterns).



1	With respect to a single observation	LN (Road Length)	N. Secondary Schools	N. Pubs	Crime (score)	Education Post 16 age (ratio)	Population Density (10 <sup>3</sup> People/Sq Km)	Population 16-29 age (ratio)	Female 16-64 age (ratio)	Constant	Alpha Parameter
2	Estimated Coefficient (EC)	0.577	0.196	0.065	0.061	0.343	0.057	2.282	-2.882	0.667	0.600
3											
4	LSOA11cd	LSOA11nm	District_Eng	Crashes_2015	Road_kms	LN_Road_kms	N_Sec_Schools	N_Pubs	Crime	Education_Post_16	Population_Density
5	E01000001	City of London 001A	City of London	17	2.2833826	0.82565794	0	4	0.242	0.13	12.62712
6	E01000002	City of London 001B	City of London	11	3.6440762	1.29310289	2	13	0.244	0.279	6.182137
7	E01000003	City of London 001C	City of London	1	0.82978857	-0.186584346	0	1	0.495	0.201	28.73096
8	E01000005	City of London 001E	City of London	20	4.365521	1.473737541	0	19	0.026	0.272	7.927215
9	E01000006	Barking and Dagenham 016A	Barking and Dagenham	0	2.5556033	0.938288321	0	0	0.182	0.1	12.74216
10	E01000007	Barking and Dagenham 015A	Barking and Dagenham	13	3.7651856	1.325797156	0	5	0.128	0.113	10.71

Published at: United Nation ITS Bulletin [http://www.indiaenvironmentportal.org.in/files/file/Bulletin88\\_final.pdf](http://www.indiaenvironmentportal.org.in/files/file/Bulletin88_final.pdf) or here  
 IET ITS Journal (ITS World Congress Special Issue) <http://dx.doi.org/10.1049/iet-its.2018.5218> or here

# Collaborators and stakeholders



# PARK Proposition

## Overall AIM

Develop processes and tools/platform for exploiting Research outputs in a more user friendly and easy way as well as maximise the access and use of Academic Research and Innovation to expert but more importantly to non-expert users.

### Objectives in the short/medium-term:

- Explore the **desire, shape and feasibility** of an innovative tool/platform to give easier access to interested actors to the outputs\* from Academic research and Innovation (using the MAGIC Project as a use case)
- Conduct a **robust stakeholder mapping** to assess the need and desire for a tool focused around an initial use case identified, the MAGIC project
- Conduct a **technical feasibility exercise** to assess the shape/format (web-platform, centralised or decentralised software, etc.)
- Involvement of MAGIC Project partners and key stakeholders (Local Authorities, Policy makers, other Academics) on the Air Quality field will make sure experts as well as non-expert perspectives and needs will be captured.

### Objectives in the long-term:

- Give a **more accessible platform** for non-expert end users such as Planners, Decision Maker, Consultancy, SMEs
- Identify **business model scenarios** that allow the new tool/platform to self-sustain in the future
- Involvement of MAGIC Project partners and key stakeholders (Local Authorities, Policy makers, other Academics) on the Air Quality field will make sure experts as well as non-expert perspectives and needs will be captured

*\*With the term outputs in this case we intend (models, mathematical formulas, etc.) that traditionally are developed to solve problems or predict events*

# Why PARK is needed?

- Existing examples

The screenshot shows the homepage of the 'konfer' website. At the top, there is a dark blue header with the 'konfer' logo on the left and 'Home', 'Help', and 'Sign In' links on the right. Below the header is a navigation bar with categories: Experts, Funding, Research, Equipment, Collaboration, Organisations, and Universities. The main content area features a search bar with a dropdown menu set to 'All', a search input field, and a red search button. Below the search bar is a 'Search Advisor' button. A 'Categories' section displays a grid of research areas: Aerospace, Defence and Marine; Agriculture, Food and Drink; Bioscience and Biotechnology; Chemicals; Communities and Social Services/Policy; Construction and Urban Living; Creative Economy; Culture, Heritage, Museums and Collections; Design; and Digital/Communication/IT. A 'Show More' button is located below the categories. At the bottom, a 'What's on konfer?' section provides statistics and links for various categories: Funding (51 opportunities), Experts (109,087 profiles), Publications (1,308,584 papers), Collaborations (16 active), and Equipment (16,152 items). Each category has a corresponding 'Find' button.

Category	Count	Description	Action
Funding	51	Millions in grant funding available for innovation across all sectors	Find Funding
Experts	109,087	Find an Expert to help you in your area of Research and Innovation	Find Experts
Publications	1,308,584	One of the largest single searchable database of Research	Find Publications
Collaborations	16	Business and Institutions looking for your help	Find Collaborations
Equipment	16,152	From Lasers to Virtual Reality, MRI scanners to Photon microscopes	Find Equipment

A national repository of Academic/Research contacts, equipment and projects, which in practice operates as an intelligent brokerage platform for UK universities and businesses. It allows users to search using keywords relating to an area of interest in order to find relevant research and “connect” with original authors to discuss further.

# Why PARK is needed?

- Existing examples

The screenshot shows a web browser window displaying an OSF project page. The browser tabs include 'Libero Mail - login', 'OSF | Air pollution acco...', and 'SHARE'. The address bar shows 'https://osf.io/b8pa6/'. The OSFHOME logo is in the top left, with navigation links for 'Search', 'Support', 'Donate', 'Sign Up', and 'Sign In'. The project title is 'Air pollution accountability of energy tr...'. Below the title, there is a description: 'Air pollution accountability of energy transitions: the relative importance of point source emissions and wind fields in exposure changes'. Contributors listed are Lucas Henneman, Loretta Mickley, and Cory Zigler. The date created is 2019-09-04 08:22 PM and last updated is 2019-09-05 06:28 PM. The identifier is DOI 10.17605/OSF.IO/B8PA6. The category is 'Analysis'. The description is 'Input datasets and analysis scripts for reproducing the results described in the associated paper.' There are three main sections: 'Wiki', 'Files', and 'Citation'. The 'Wiki' section contains text about code and data used for the analysis. The 'Files' section shows a table with columns 'Name' and 'Modified', listing 'Air pollution accountability of energy transitions: the relative import...' and 'Data\_and\_code.zip'. The 'Citation' section shows a 'Recent Activity' feed with several entries detailing the creation and modification of the project and its files.

The OSFHOME logo is at the top left of the list. Below it, the text 'Air Quality' is displayed. The list consists of several license entries, each with a count in a small circle to its right:

- CC-BY Attribution 4.0 International (215)
- GNU General Public License (GPL) 3.0 (205)
- CC0 1.0 Universal (36)
- Mozilla Public License 2.0 (18)
- GNU General Public License (GPL) 2.0 (13)
- Other (5)
- GNU Lesser General Public License (LGPL) 2.1 (3)
- BSD 3-Clause "New"/"Revised" License (2)
- Apache License 2.0 (0)
- Artistic License 2.0 (0)
- BSD 2-Clause "Simplified" License (0)
- CC-BY Attribution-NonCommercial-NoDerivatives 4.0 International (0)
- CC-BY Attribution-ShareAlike 4.0 International (0)
- Eclipse Public License 1.0 (0)
- GNU Lesser General Public License (LGPL) 3.0 (0)
- MIT License (0)

# Why PARK is needed?

- Other platforms

The screenshot shows the Australian Government IP Australia website. At the top left is the Australian Government logo and 'IP Australia' text. At the top right are 'Register' and 'Log in' links. The main header is a dark banner with the text 'WELCOME TO THE IP DATA PLATFORM' and 'Your gateway to international intellectual property data.' Below this is a 'REGISTER FOR A FREE TRIAL' button. The main content area is titled 'IP Data Platform' and contains two paragraphs of text. The first paragraph describes the platform's purpose for researchers and policy makers. The second paragraph invites policy makers to share challenges via email at [IPDataPlatform@ipaustralia.gov.au](mailto:IPDataPlatform@ipaustralia.gov.au). Below this is a 'News' section with a featured article about the 2019 IP Government Open Data (IPGOD) release, including a 'Read more' link. The 'Datasets' section follows, listing four datasets: TM-Link, PATSTAT, IP Government Open Data, and IP Longitudinal Research Data, each with a brief description and a 'Read more' link. At the bottom, there is a call to action to add data to the platform via email at [IPDataPlatform@ipaustralia.gov.au](mailto:IPDataPlatform@ipaustralia.gov.au).

Australian Government  
IP Australia

Register | Log in

## WELCOME TO THE IP DATA PLATFORM

Your gateway to international intellectual property data.

[REGISTER FOR A FREE TRIAL >](#)

### IP Data Platform

Enables researchers and policy makers to investigate and interrogate data in a powerful analytical environment to make decisions and to create economic and policy insights.

Help us build a connected IP data community that solves common data challenges. If you are a policy maker, we would love to hear your trade mark policy challenges. Email us at [IPDataPlatform@ipaustralia.gov.au](mailto:IPDataPlatform@ipaustralia.gov.au).

### News

#### IP Government Open Data (IPGOD)

IP Australia has released IPGOD 2019. The latest edition builds on the significant enhancements that were made to the dataset in 2018.

[Read more](#)

### Datasets

Register to access a series of intellectual property datasets from around the world.

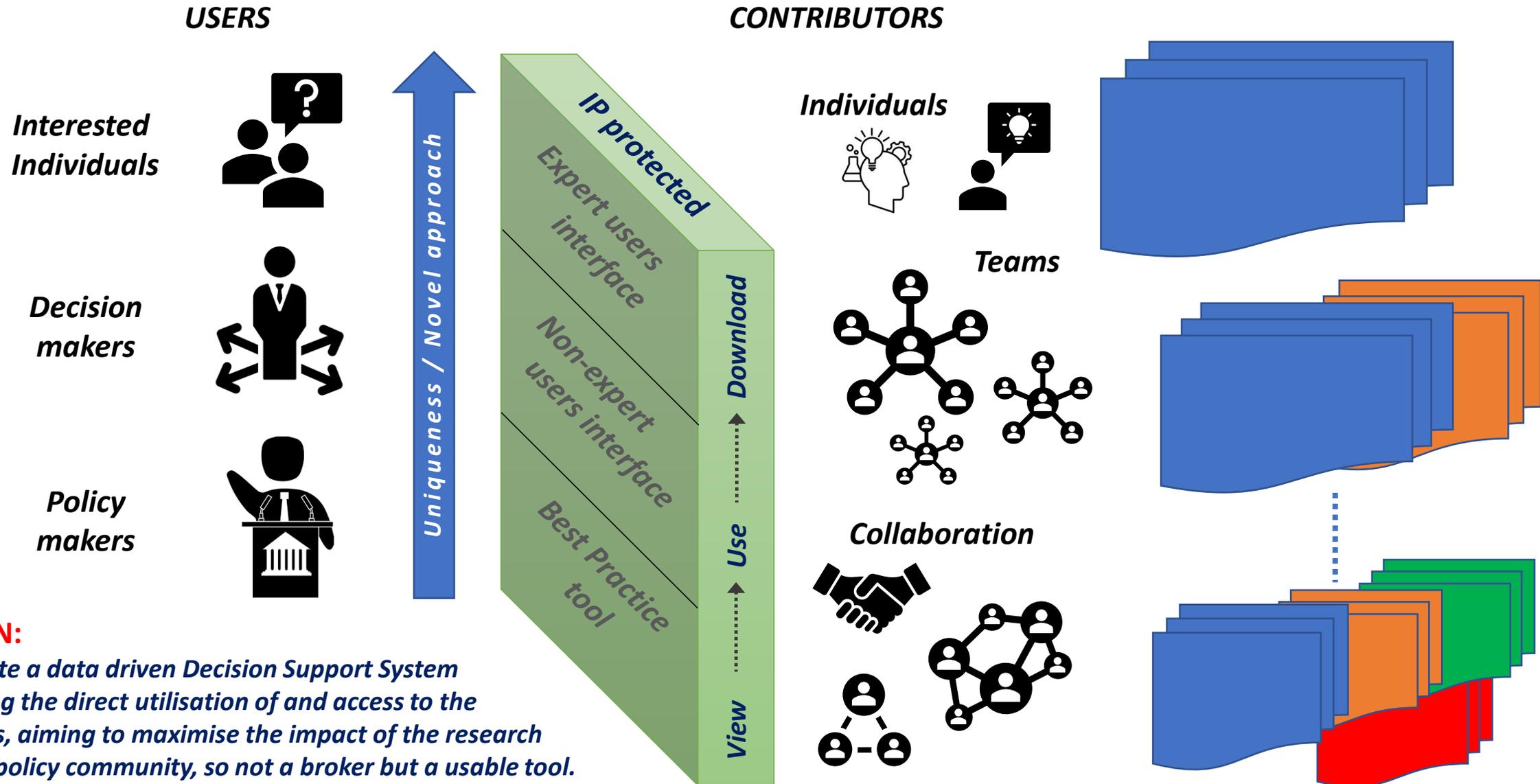
- TM-Link**  
Beta version of an international trade mark dataset, including data from Australia, New Zealand, United Kingdom, the European Union, Canada and the USA.  
[Read more](#)
- PATSTAT**  
International patent dataset, developed and maintained by the European Patent Office (for licenced users only).  
[Read more](#)
- IP Government Open Data**  
Australian patent, trade mark, design and plant breeder's rights records.  
[Read more](#)
- IP Longitudinal Research Data**  
Australian dataset of stocks and flows of intellectual property rights filed over the last 20 years.  
[Read more](#)

More data is being added constantly. To add your data, to the IP Data Platform, email us at [IPDataPlatform@ipaustralia.gov.au](mailto:IPDataPlatform@ipaustralia.gov.au).

# Why PARK is needed?

- *Traditional or existing tools/platforms allow to simply search using keywords relating to an area of interest in order to find relevant research and eventually “connect” with original authors to discuss the subject further.*
- *No tool/platform gives a user the capability to use the research of others, unless it has already gone through a long and expensive process to convert the research output (low TRL) into a software or models suite (higher TRL), which most of the time is licensed and expensive to buy/use.*
- *To make a move to break the big barriers of it traditionally being too hard for non-experts to use novel models and innovative approaches.*

# PARK – High level concept



## **VISION:**

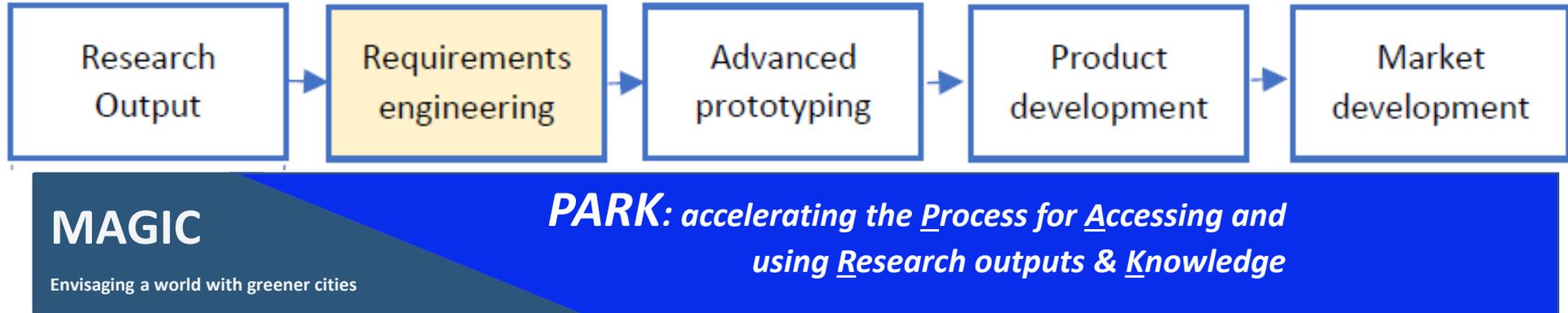
*To create a data driven Decision Support System allowing the direct utilisation of and access to the outputs, aiming to maximise the impact of the research by the policy community, so not a broker but a usable tool.*

# How PARK and MAGIC can mutually benefit?

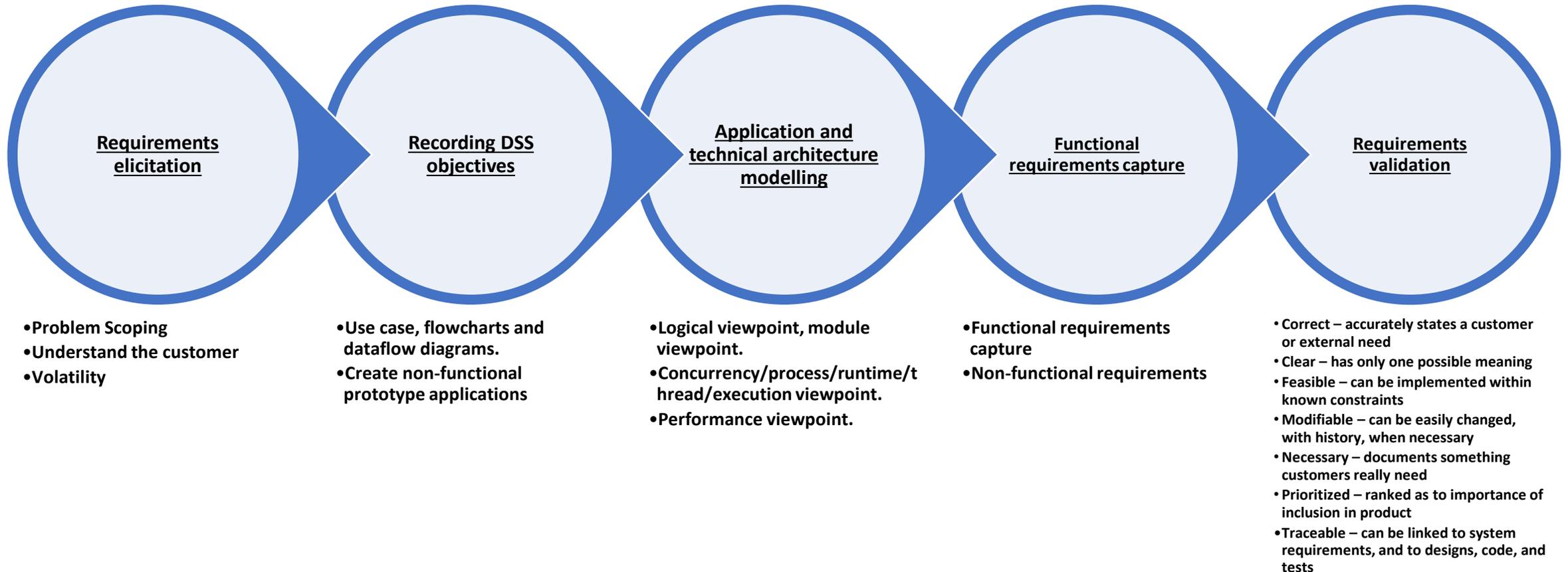
MAGIC as identified case study for the PARK project is about Air Quality improvement in cities and, in particular, inside buildings. In the long-term by developing the PARK tool/platform we expect two main positive results:

- 1. Provide early access to non-expert users to new and innovative research,**  
*dual benefit, at an early stage will inform the researcher/IP owner on drawbacks and things that should be modified/improved; at a later stage to already have a group of potential beta-tester for a near to market product.*
- 2. Accelerate the process of emerging ideas and solutions to move faster into TRL ladder,**  
*benefit for the UK economy and to increase the chances of playing a world leading role in the future, as time is a key component for the penetration and acquisition of market slices in the different sectors.*

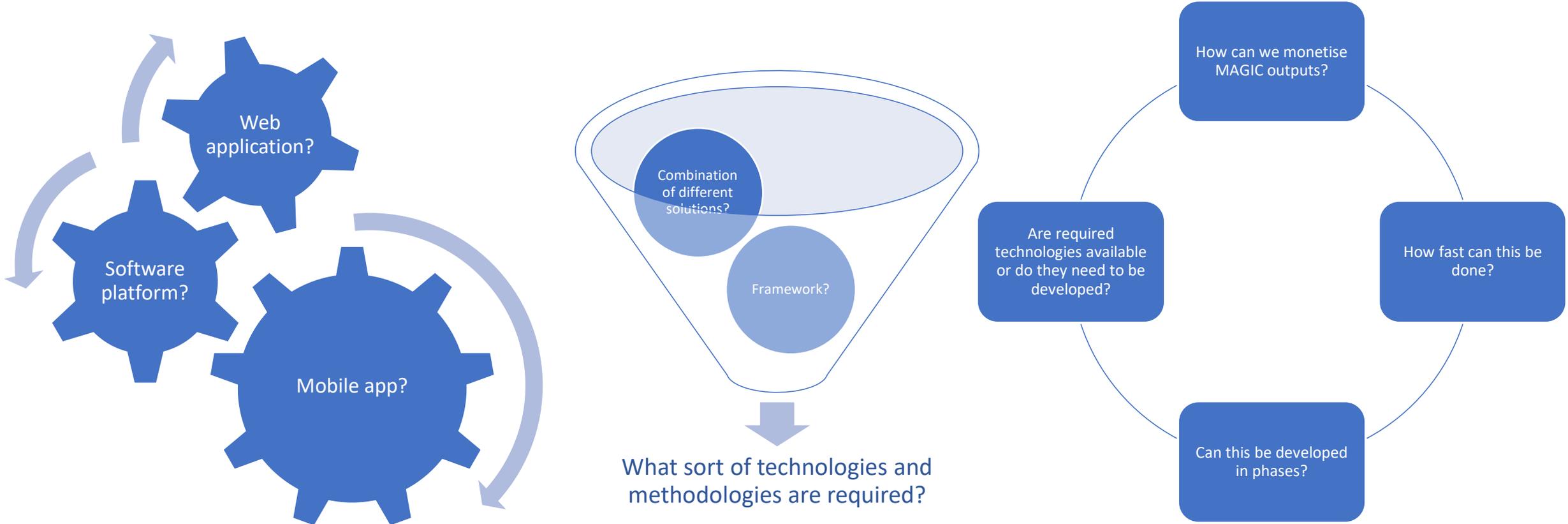
# Can MAGIC play at the PARK?



# Next steps...



# The assessment process should churn out answers like these



# Thanks for your attention



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Technologist

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