
Developing 'future' and current models for highways services

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The aim of the session

- A tiny bit about Gaist, exploding a few myths!
- A sector in change with more coming.....
- ICT and it's relentless march onwards
- Financial modelling using technology to increase understanding

The Challenges

Changing Policy

WGA, Capital Allocations Policy Review, HMEP Action Plan, Capital Incentive

Move from Performance Indicators to Outcomes based measures

HAMP/TAMP Band 3 Rating, Challenge Fund etc. etc.

Declining Network – Shrinking Budgets

Declining service levels and public opinion

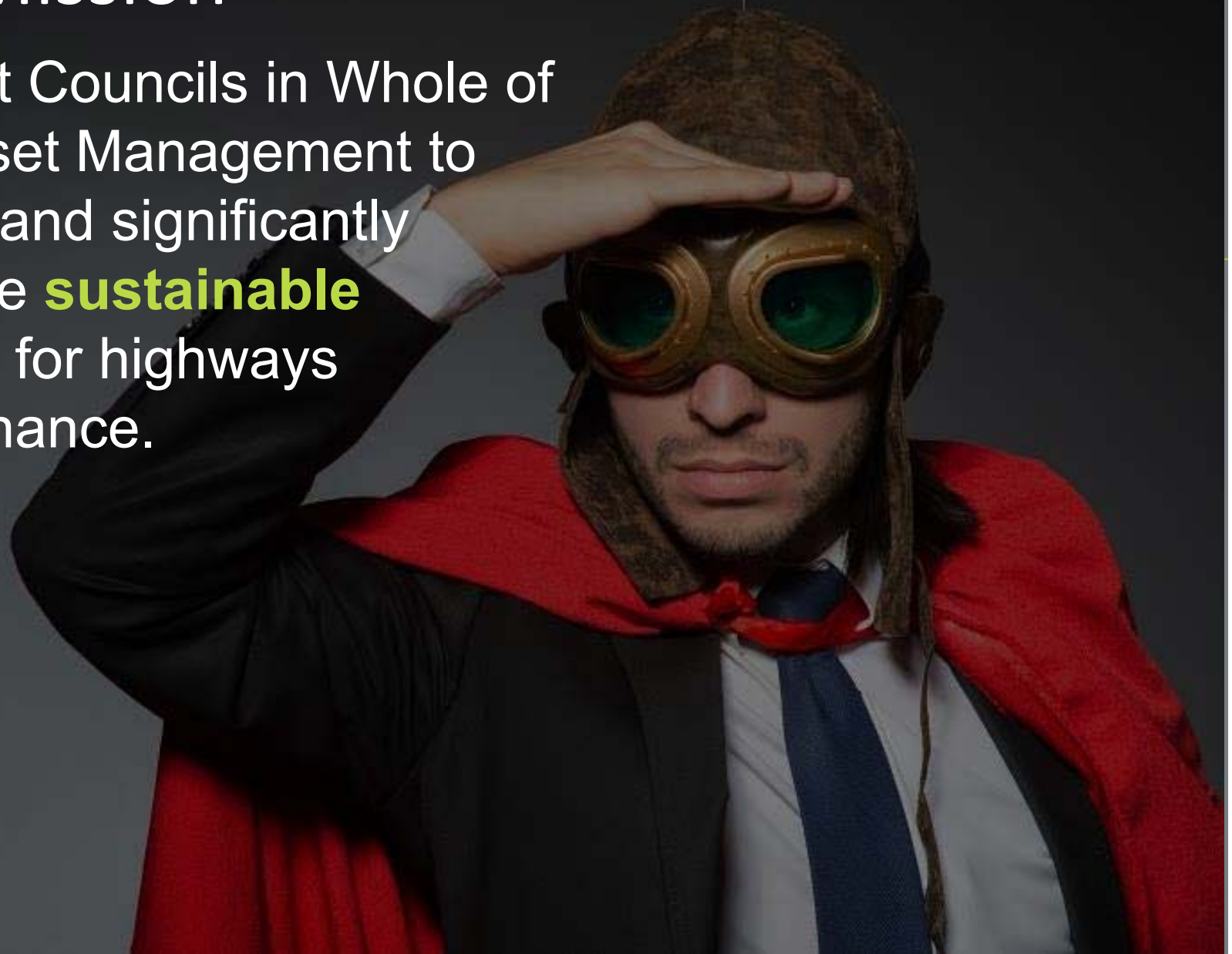
Advancing technology & the rise of community action



Lancaster University – our home – why?

Our Mission

Support Councils in Whole of Life Asset Management to secure and significantly increase **sustainable** funding for highways maintenance.



Some of the people we work with



MANCHESTER
CITY COUNCIL



Blackpool Council
BUILDING A BETTER COMMUNITY FOR ALL



PLYMOUTH
CITY COUNCIL



HALTON
BOROUGH COUNCIL



southend
on sea
BOROUGH COUNCIL



Lancashire
County
Council



STOCKPORT
METROPOLITAN BOROUGH COUNCIL



Warrington
Borough Council



HARTLEPOOL
BOROUGH COUNCIL



Cumbria
County Council



TRAFFORD
COUNCIL



Shropshire
Council

Project Beacon

West Yorkshire Resilience Forum

Leeds City Council

Yorkshire Water

one+ Integrated Highway Services

BASF The Chemical Company

City of Bradford Metropolitan District Council

Environment Agency

NHS Kirklees

The Mid Yorkshire Hospitals NHS Trust

BRITISH TRANSPORT POLICE

WEST YORKSHIRE POLICE



DCLG Olympics



le
de TOUR
FRANCE



gaist
integrated intelligence





MINISTRY OF DEFENCE



www.milpictures.com

Resilience



Technology moving fast (1)

- Technology is an enabler don't be fooled into thinking otherwise
 - Are you getting all you want
 - Expensive? No.....
- We now consume the world in Apps
 - often developed outside of professional 'constraints'
- Technology being developed to disrupt the status quo...get used to this

- They are easy to use
- They allow information to be shared
- They are live
- They allow specific interest groups to form
- They are more valuable the more they propagate
- People engage with them – they like to use them

Shouldn't we learn from this?



Technology moving fast (2)

- Drone based technology
- 3D technology
- Technology that allows better decisions
- Embracing community derived technology
- Next generation...



KTP Research

- Deterioration Modelling
- Maintenance Optimisation
- Urban pollution monitoring
- Computer Vision



Asset Management Support

- Highways Asset Management Plans
- Whole of Government Accounts
- Prudential Borrowing
- Investment planning
- Program Identification
- VfM Reporting

Deterioration Modelling

KTP@40

40 Years of Knowledge Transfer Partnerships

Innovate UK

Technology Strategy Board

THE UNIVERSITY *of York*


UNIVERSITY OF Hull

gaist

What our LA colleagues asked

1. How do I get my members to think long term?
2. How can we show what happens if you don't think long term?

Empower Councillors or Officers to lead Asset Management

- Ownership of decisions
- Ownership of implications
- Political collateral

Our solution - Key Features

Powerful visualisations

- *A picture tells a thousand words*
- Outputs used to communicate at many levels
 - Engineers, Execs, Members, Public?
- Human brain excels at identifying patterns visually

Our solution - Key Features

Optimisation

- Not just simulation
- Optimisation
 - What is the cheapest way to maintain a certain service level?
- Outputs
 - How much to spend, on which treatments, on which assets, in each year and how much to borrow
- *This is not trial and error*

Our solution - Key Features

Financial Modelling

- (Prudential) Borrowing
 - Need to demonstrate savings over long periods
 - Cost of works increasing
(Construction/Tender Price Index)
 - Other costs associated with condition
 - Reactive works, Insurance claims, Economic costs?
 - Backlog – *what are we leaving for future generations*
-

Our solution - Key Features

Interactivity

- Break the traditional consultancy norm
- Get the user 99% of the way to the solution and let them make the final 1%
 - Confidence in the solution
 - Ability to make the final adjustments
- Vital for *what-if* analysis
- Cloud based

Our solution - Key Features

Easy Adoption

- Start simple, build up detail
- Easy to use
- Easy transition for anyone who had put work in to HMEP toolkit (or hasn't used it)
- No IT installation accessed through web browser

The Model

Asset Groups

- Assets are split into homogeneous groups
 - Highway maintenance groups? Hierarchy of wards? The age of the road? Construction type?
 - Groups deteriorate at a similar rate, and have similar costs associated with them
- Asset groups are split into three categories that can be in
 - Functional? Condition? Damage?
- *The decisions must be data driven*



76
triangles



251
triangles



2,502
triangles



69,451
triangles

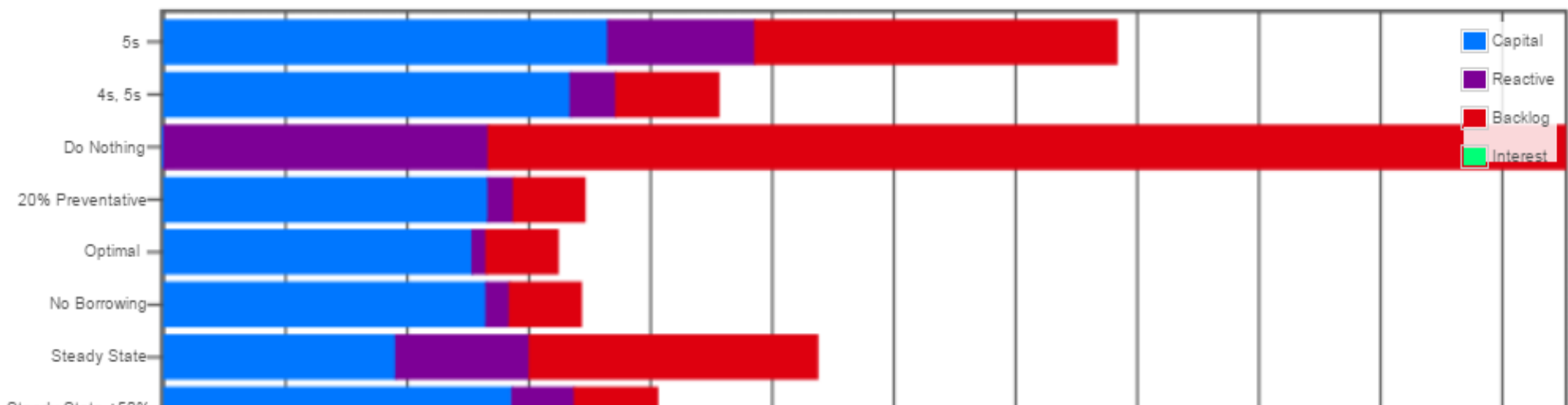
Our solution - The Model

Markov Decision Process

- Each year:
 - Deterioration is simulated
 - Treatment policy is actioned (or the optimal treatment policy is calculated)
 - Costs are calculated
- The optimisation process calculates the optimal treatment each year that minimises the total cost over the simulation period
 - If borrowing is an option, how much and over what period to borrow/repay is also optimised

A glimpse of the solution

- Online solution
- Simulate very simple to extremely complex models
- Provide visual feedback responsively (not within days)



Having a tailored session

- Dr Remde – Director Innovation & Research
Stephen.remde@gaist.co.uk
- It's not a sales workshop
 - Uses your own data
 - DfT tried to break it.....couldn't
- There is no cost, part of our commitment to share
- Generally ½ day (2/3 Hours)

Passionate Disruptors

- Use technology to help you
- Beware of 'behaviour change' impacts on your own staff
- Change is happening and technology will only drive this faster
- Technology is practical and SHOULD help not hinder

Thankyou
&
always happy to talk

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