



Project Controls
E X P O

Project Controls Expo – 16th Nov 2017
Emirates Stadium, London

**Programmatic Controls,
an approach to
Fast Track Disaster Recovery**

About the Speaker

Saurabh Bhandari

Technical Director, Project Controls & PMO

Mott MacDonald

- 16+ years of Construction and design
 - Passionate about leveraging project controls for delivering success
 - Author of MM Controls best practice – PACE
 - Worked in UK, Australia, Middle East, SE Asia
 - Experience: Heavy civils, SHE buildings, Transport projects, Master planning but essentially you will find me solving problems and sermonising
- **What else;**
 - Avid reader of books on anything interesting but mostly management and economics
 - Technology freak

The Topic

Storm Desmond - Cumbria Infrastructure Recovery Programme



When disaster events strike, the institutionalised methods of delivering recovery are stretched to a breaking point.

Insights

&

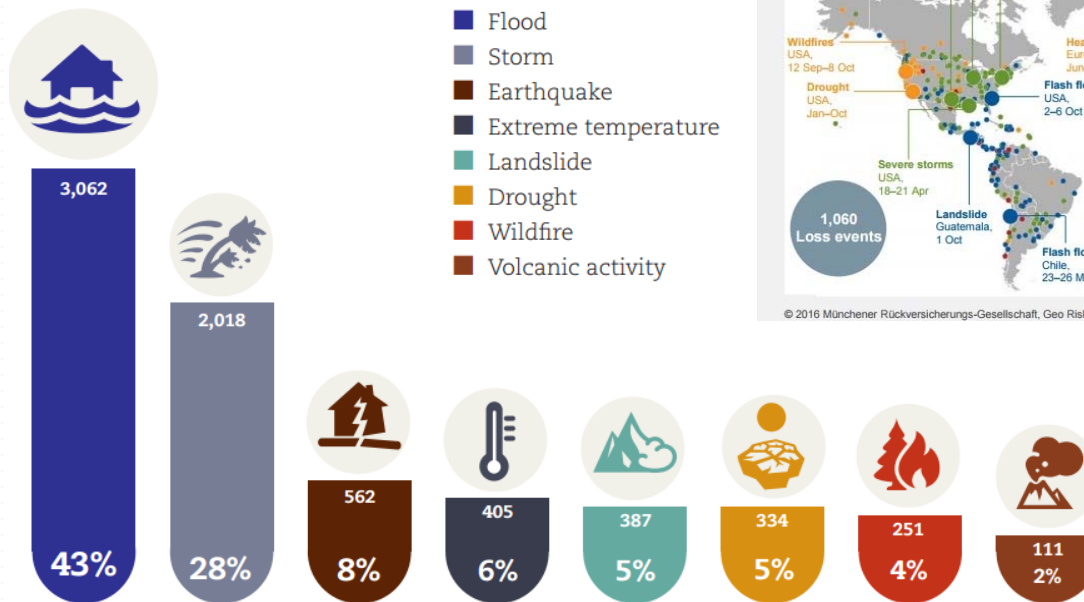
Guidance

Agenda

- Relevance of post-disaster recovery and rebuild
- Cumbrian Context
- A differentiated Approach
 - Why
 - What does it mean
 - How
- Insights
 - The practical stuff
- Questions and Discussion

Relevance of Post-disaster rebuilds

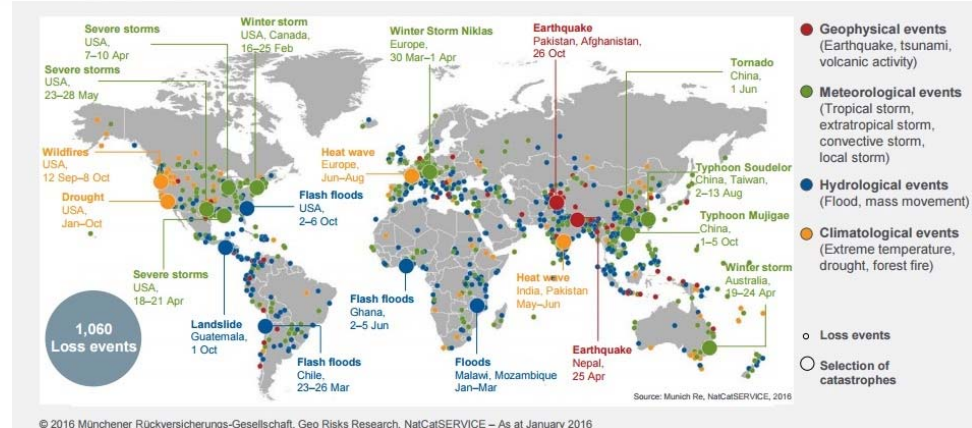
Percentage of occurrences of natural disasters by disaster type (1995-2015)



NatCatSERVICE

Natural loss events worldwide 2015
Geographical overview

Munich RE



Relevance of Post-disaster rebuilds



Post – Disaster rebuild requires a forward thinking and urgent approach;

Action and not para(na)lysis

A disaster will become a Mega-crisis unless we stop the domino effect

Welcome to Cumbria



What Happened

Storm Desmond: 1 to 6 December 2015 (Cumbria)



Storm Desmond brought exceptional rainfall to the north west of the country. In a 24 hour period, 34.1 cm of rain fell at Honister, Cumbria - the highest ever recorded.



1.15 trillion
litres of rainfall



Enough to cover all
of Cumbria with
16.1 cm of water



Rainfall would fill
Wembley stadium
almost **290 times** over



The Impact

Carlisle

Pooley Bridge

Flimby

Cockermouth

A592

A591

Kendal

Appleby

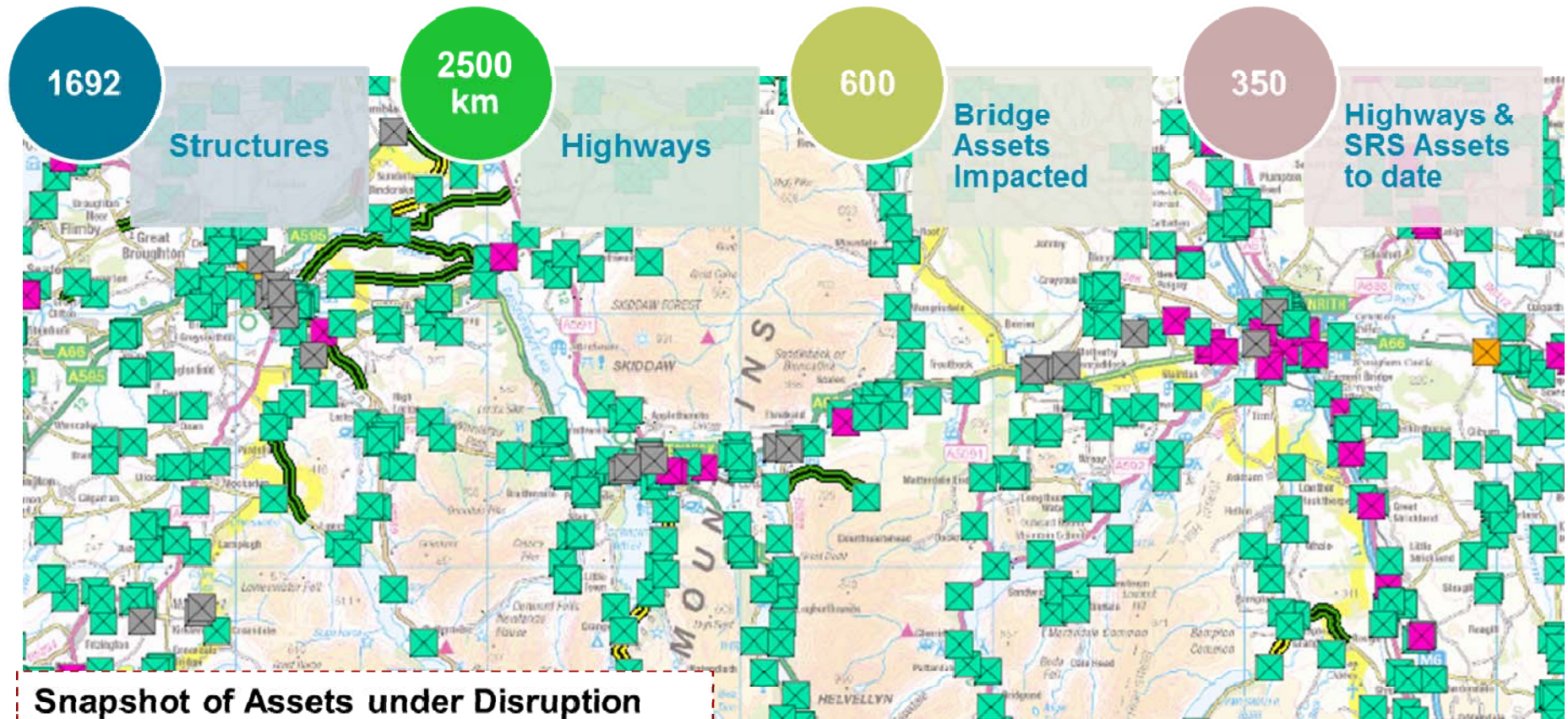
Damaged bridge

10km

6): 272421.28 471879.53

Map labels: Maryport, Dalton-in-Furness, Barrow-in-Furness, Wearhead, North Pennines, COUNTY DURHAM, Bishop, Barnard Castle, Yorkshire Dales, NORTH VO...

The Scale



The Mission - WHY ?

It wasn't just about re-building infrastructure

• Preventing crisis through proactively connecting all sections of the community through targeted implementation of resilient interventions

• Safeguarding the 'Fragile' - Tourism economy

1. Safety:

• Ensuring safety is not compromised in the recovery of assets and a safety culture is embedded in to the supply chain.

1. Efficiency

• delivering restoration of assets within the cost and time budget, through rigorous/creative control

1. Value:

• implementing solutions which enhance the benefit to the community.

1. Local Economy:

• **support local economy** through **engaging local contractors** and using every opportunity to inject spending locally, and ensuring prioritisation of projects balance the needs of the community.

1. Legacy:

• **creating and developing local skills** for Cumbria in terms of human resource capacity and systems; within client and the wider supply chain.

The Stakeholders – Fairness & Scrutiny

Demands in a post disaster rebuild



These were a lot of things to balance; and maintain agility in delivery.

So: We used our 2 models of differentiated controls

Level of Control α (Complexity) – moderated by Risk appetite

Emergent Baseline – “A baseline which has broad buy in; with clear understanding of the uncertainties, emergent risks and cycle of refinement; through logical and transparent use of ‘reference class’ methodologies.” - *Bhandari 2016*

A differentiated approach (driving predictable delivery©)

We defined a Programmatic Controls approach that was agile, broad, and integrated. Using control methods as a lever to deliver 'effective' outcomes.

Baselines were used as guides to plan and not barriers to delivery.

Programme Controls

- Delivering **Effectively**
- Blueprint Driven (plan)**
- Leveraging Governance**
- Leading **Change**
- Emergent **Baselines**

vs.

Project Controls

- Delivering **Efficiently (TCQ)**
- Schedule Driven**
- Compliance**
- Managing **Change**
- Stable Baselines

Failure is not an option!

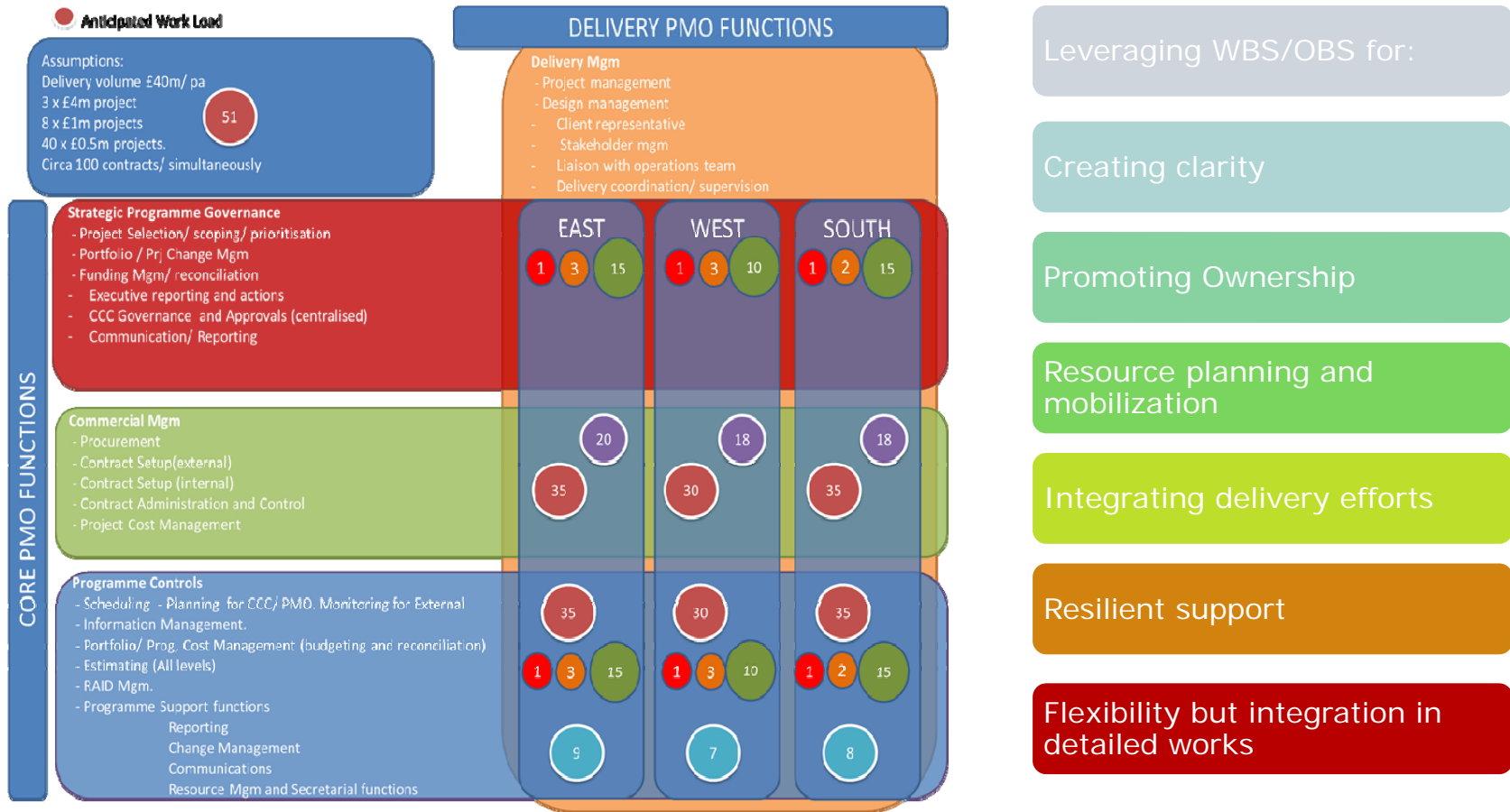
Managing – The Emergent Baseline

How did we do it?

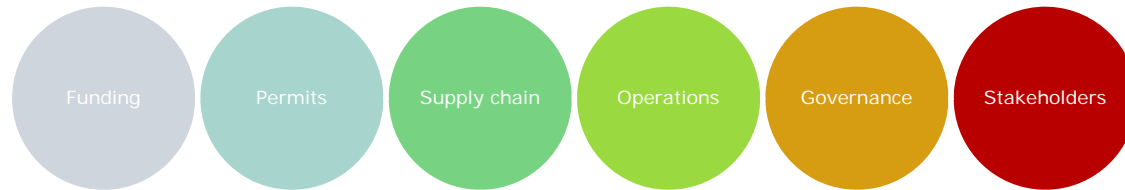


Creating Clarity and Control

an Integrated Works and Organisation Structure



How did we organise - Delivery led OBS



Risk Sources

Align the team configuration to managing risks

Think in control accounts

We made the CAM most impacted; the owner for each of the risks; and worked through them in small Sprints

Planning the Rebuild – The Emergent Baseline



Brougham Old Bridge

Building the Emergent Baseline

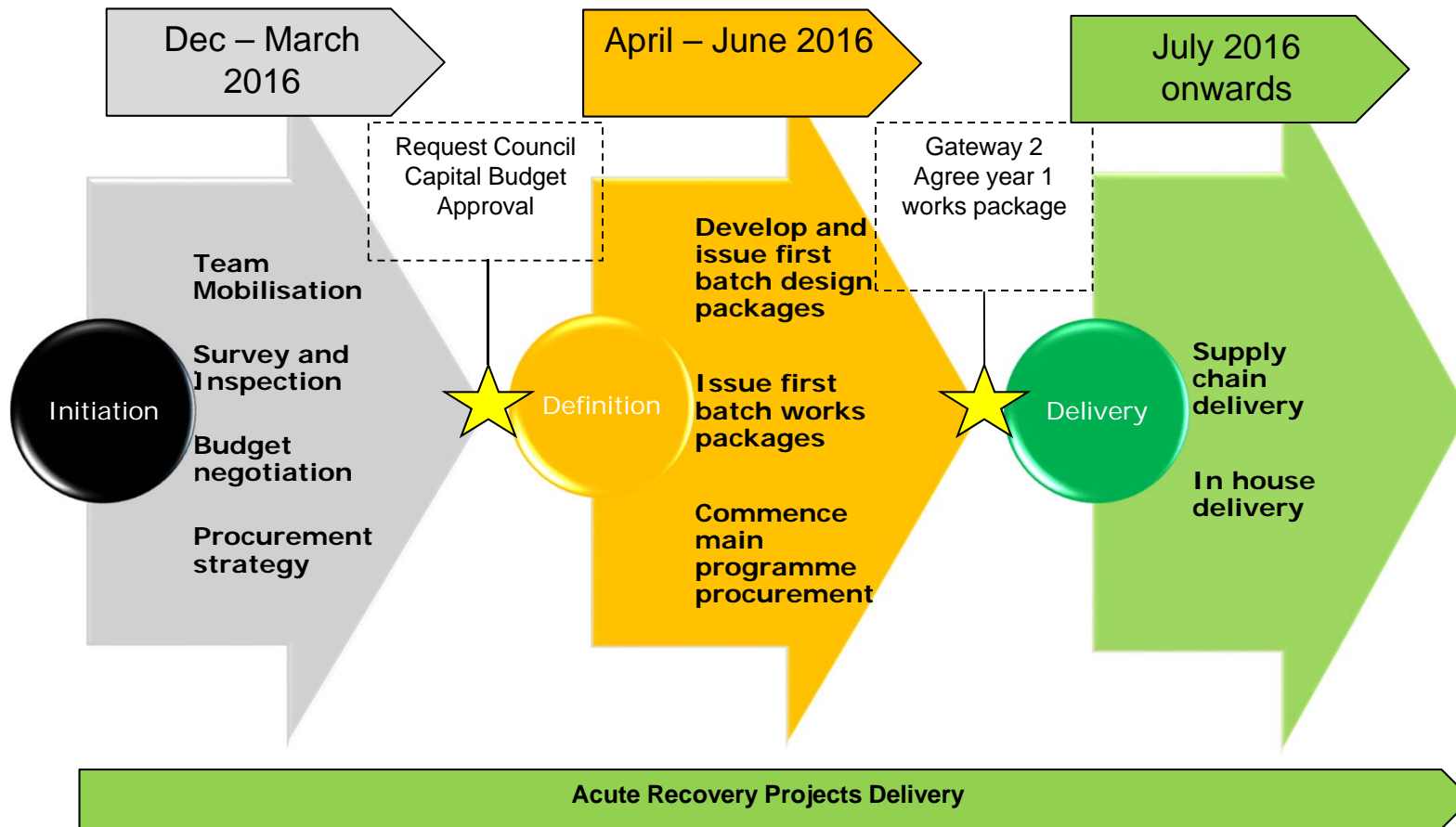
We were quite sure on why

BUT we had a small planning problem!!

- Where do we start?
- What do we recover, repair, rebuild?
- Where is the asset? – it's below the waterline
- What's the sequence?
- Who's the Stakeholder?
- What's the budget? Will we get funding?
- What are the risks?
- What's the success criteria?
- Who will build?



The Timeline – aka Dilbert Plan



Traditional Planning - its too laborious!

(So we broke convention – GIS based data rich planning)

The screenshot displays a GIS application interface. On the left, there are two main menu sections: 'Bridges and Culverts' and 'Carriageways and Slopes'. The 'Bridges and Culverts' section includes items like 'Bridges and Culverts', 'Winter Monitoring', 'Bridges in Final 2016 Work Packages', 'All Prioritised Bridges', 'All Prioritised Culverts', 'Bridge Surveys 2017 - James Fisher', 'Bridge Surveys 2017 - Additional', 'All Bridge Assets', and 'All Culvert Assets'. The 'Carriageways and Slopes' section includes 'Carriageways and Slopes', 'East Carriageways in Work Packages East', 'South Carriageways in Work Packages', 'West Carriageways in Work Packages', 'Carriageways in Work Packages by Priority (All Areas)', 'Carriageway and Slopes Prioritisation', 'NSG Network (22/06/2016)', and 'CCC 3 Year Carriageways'. The central map shows a geographical area around Windermere, with various colored markers and lines representing different asset types. On the right, a vertical list of benefits is shown in colored boxes:

- Leveraging technology for :
- Combining decision information
- Data rich identification of assets
- Existing asset data layers and status
- Integration and efficiency
- Understanding the county wide issues
- Multi layered asset information
- Understanding each asset intimately
- Unambiguous visibility of asset data
- Making smarter resource decisions

And then we scheduled the works

We went from 1690 assets to 40 work packages in 6 weeks

What does that mean?

How do you plan in GIS

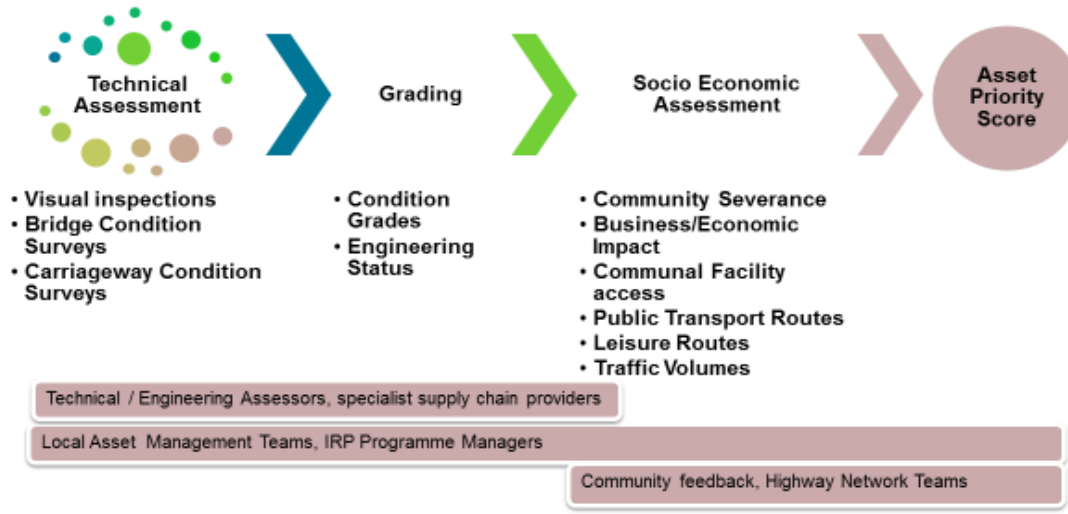
The screenshot displays a GIS application interface. On the left, there is a menu with three main sections: 'Bridges and Culverts', 'Carriageways and Slopes', and 'Reference Layers'. The 'Bridges and Culverts' section is expanded, showing a list of asset categories with checkboxes. The central map shows a geographical area with various colored polygons representing different infrastructure assets. On the right, a data table provides details for a specific asset named 'CROOKWATH'. The table includes fields such as Delivery Year, Status, Road Number, Portfolio, Delivery Strategy or Work Package, Asset No. Name, Location, District, Electoral Division, Grid Reference, Prioritisation (H/M/L/TBC), Standard Summary Scope, Summary Scope, Asset Source, Change Request ID, CCC Asset Number, IRP Asset Code, Delivery Team, Watercourse Designation, River Name, Remarks, Finance Project Code, Cost Centre, Funding Source, Procurement Route, Conject Project Number, Conject Cost Code, Build Contract Budget, and Confidence Level.

CROOKWATH	
Delivery Year	2017/2018
Status	
Road Number	U3174
Portfolio	BRIDGES & STRUCTURES
Delivery Strategy or Work Package	WP17/BE2
Asset No. Name	CROOKWATH
Location	CROOKWATH
District	EDEN
Electoral Division	EDEN LAKES ED
Grid Reference	351748/522254
Prioritisation (H/M/L/TBC)	M
Standard Summary Scope	REPAIR OF FLOOD DAMAGE AND MEASURES TO IMPROVE RESILIENCE
Summary Scope	UNDERMINED ABUTMENT AND PIER
Asset Source	MINOR
Change Request ID	
CCC Asset Number	U3174/827
IRP Asset Code	ED367
Delivery Team	IRP TEAM
Watercourse Designation	Main River
River Name	Lowther
Remarks	
Finance Project Code	QLDFT2FM
Cost Centre	QLDFT2
Funding Source	DIT
Procurement Route	D&B
Conject Project Number	1233
Conject Cost Code	02-BRS-E-ED-ED367-FM-DIT
Build Contract Budget	£ 33,474.10
Confidence Level	10

How do you create 'fair' Schedule ? –

(Hint: Democratically)

Sequencing the priority: Socio Economic scheduling



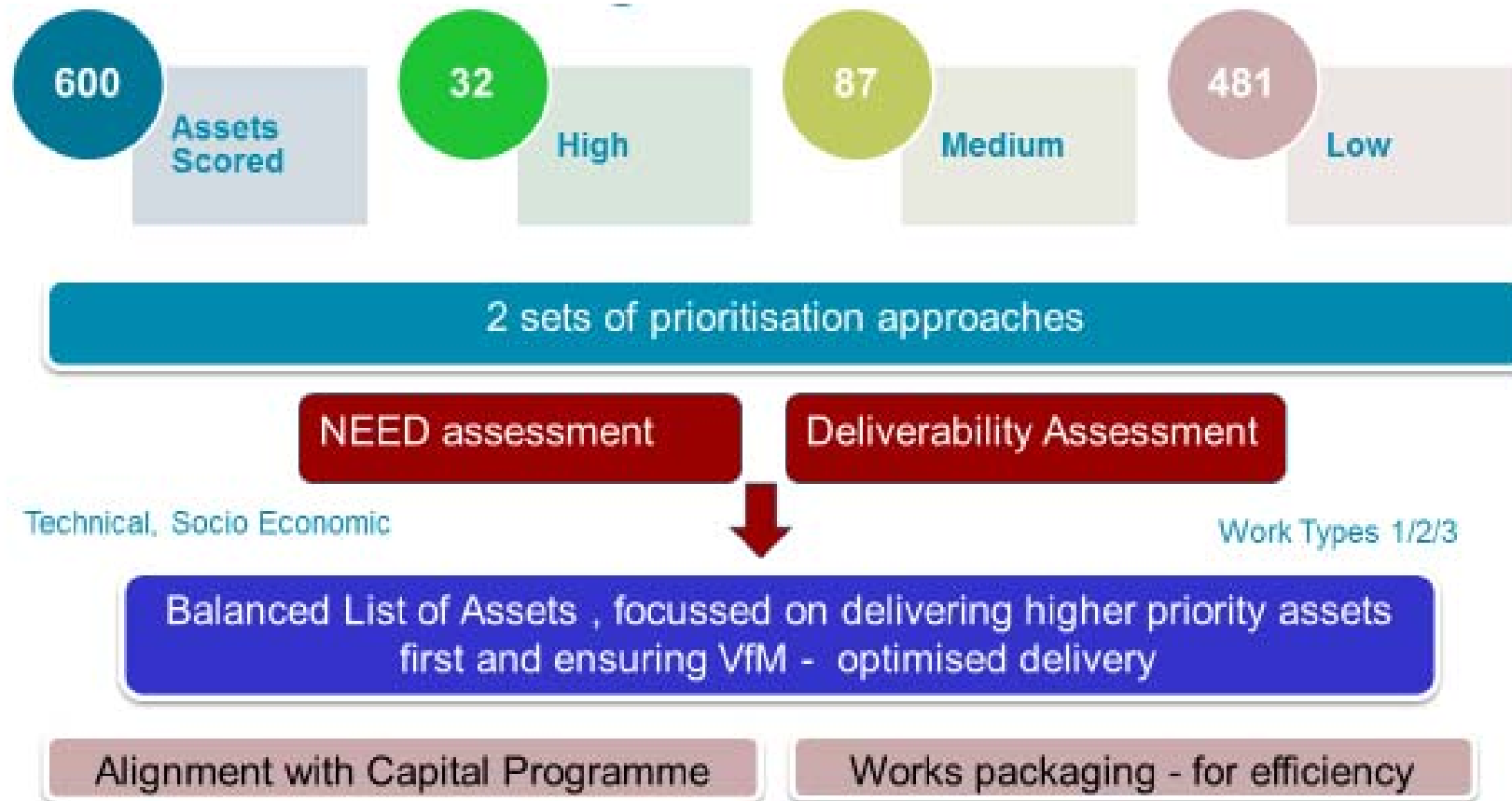
Post - disaster rebuilds are inherently sensitive; its about making the **important** stuff happen first; in a logical, empathetic and democratic manner.

Period	Schemes	Condition Survey Grading	Technical Assessment	Grading	Socio Economic Assessment	Asset Priority Score	Technical Assessment	Grading	Socio Economic Assessment	Asset Priority Score	Ranking
9											
10											
11											
12											
13											
14											
15											
16											
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18											
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21											
22											

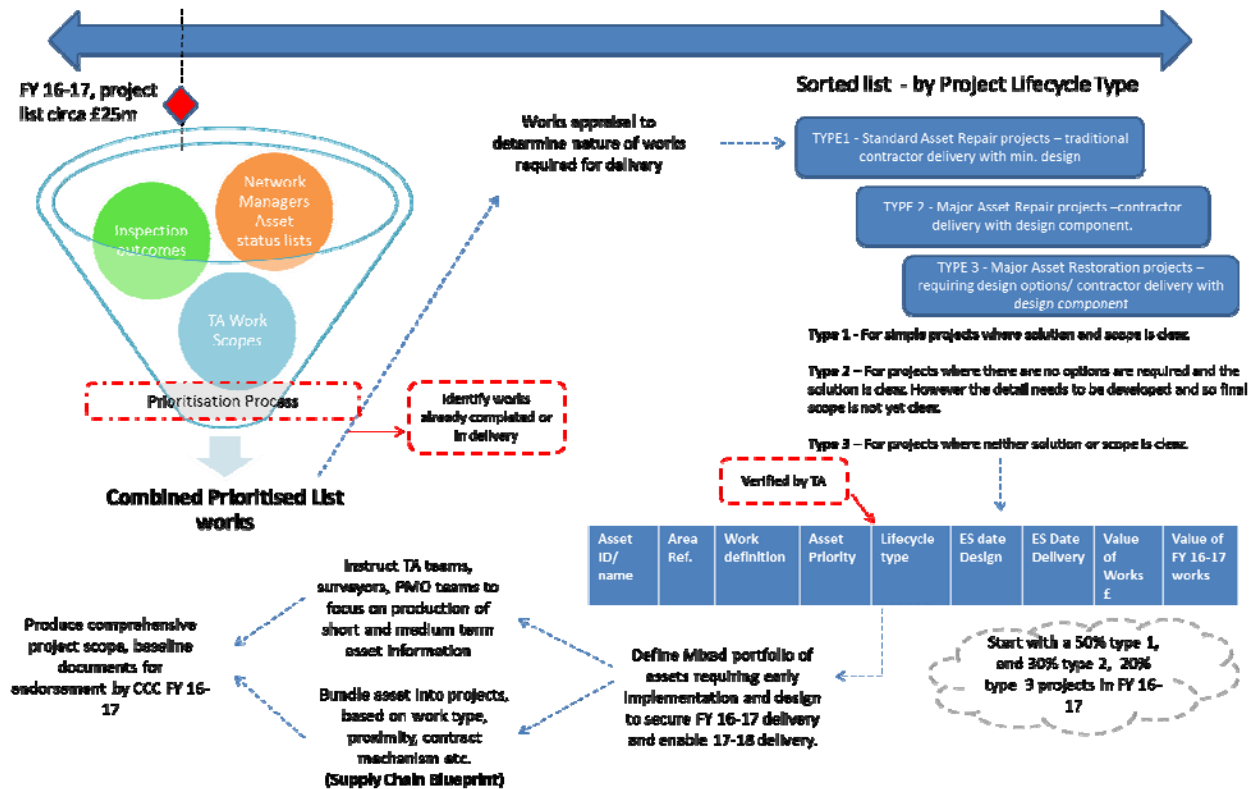
Labels below the table: Gaist Condition Survey Inputs, Socio Economic Assessment Inputs, Socio Economic Assessment Calculations, Technical Factors Calculations, Priority Status Calculations, Ranking Calculations

Works Planning and Prioritisation Process –

Dealing with Political and Delivery complexity



Communicate to be understood



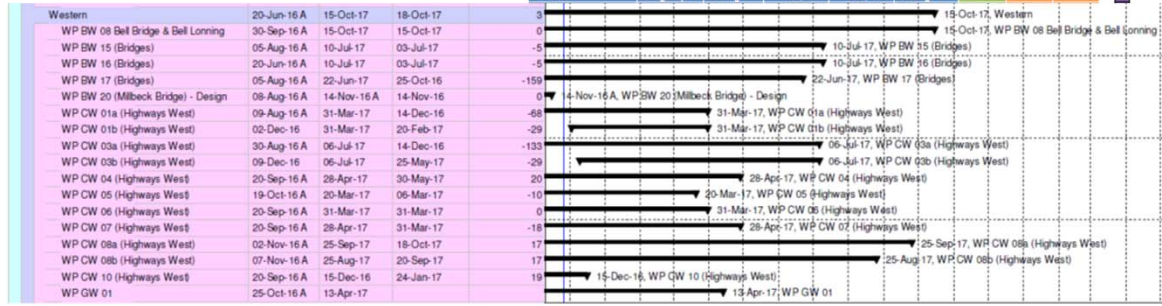
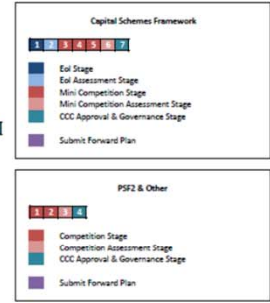
We recognised early that our Do-ers were not comfortable with GANTT; but could follow a workflow - so we drew pictures

Works Scheduling – Short Horizon Plans

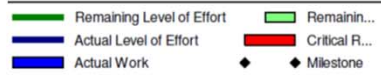
We did create some GANTT charts for tracking the Sprints; but mostly we used good scheduling practice irrespective of the tool – so people executing owned it and lived by it.

IRP FY 16/17 Procurement Plan4Plan (Consolidated)

Work Package	Portfolio	Requirement (Design/D&B/Build)	WP Value (£)	Supply Chain Value: est. RBC	CSF Framework Route	Forward Plan			Timeline																						
						Required Y/N	Submitted Y/N	Approved Y/N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP08	Bridges	Design	£566,000.00	£569,400.00	PSF2	Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP15	Bridges	Design	£44,000.00	£39,000.00	PSF2	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP16	Bridges	Design	£40,000.00	£36,000.00	PSF2	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP17	Bridges	Build	£631,360.00	£568,224.00	CSF 2A	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP18	Bridges	Build	£276,860.00	£10,016.00	CSF 2A	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP19	Bridges	Build	£188,920.00	£170,028.00	CSF 2A	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP20	Bridges	Build	£87,380.00	£780,642.00	CSF 2B	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP21	Bridges	Build	£690,460.00	£441,434.00	CSF 2A	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP22	Bridges	Build	£1,516,860.00	£1,366,154.00	CSF 2B	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP23	Bridges	Build	£413,000.00	£371,900.00	CSF 2A	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP24	Bridges	Build	£1,130,460.00	£999,414.00	CSF 2B	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP25	Bridges	Build	£608,000.00	£367,200.00	CSF 2A	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP26	Bridges	Build	£277,460.00	£165,714.00	CSF 2A	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP27	Bridges	Build	£549,000.00	£94,300.00	CSF 2A	Y	Y		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP28	Bridges	Design	£37,000.00	£33,900.00	PSF2	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP29	Bridges	Design	£350,000.00	£335,000.00	CSF 2A	N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP30a	Carriageways	Design	£246,581.45	£131,824.45		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP30b	Carriageways	Design	£946,755.30	£52,079.77		Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP31	Carriageways	D&B	£563,598.78	£507,238.90		Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP32	Carriageways	Design	£182,187.10	£163,968.39		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP33	Carriageways	Build	£148,761.63	£142,733.51		Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP34a	Carriageways	Design	£364,719.76	£310,247.77		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP34b	Carriageways	Build	£1,450,677.28	£1,305,609.56		Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP35	Carriageways	D&B	£253,626.10	£228,533.48		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP36	Carriageways	Build	£218,533.03	£266,333.91		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP37a	Carriageways	Design	£105,734.24	£95,360.82		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP37b	Carriageways	Design	£169,037.80	£152,133.84		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP37c	Carriageways	Design	£369,596.32	£332,436.40		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP38	Carriageways	Build	£457,419.76	£62,877.72		N	N/A		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
WP39	Carriageways	Surfacing	£904,188.43	£853,769.50	Surfacing	Y	N		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23



Works progress review on weekly tracking and daily shop floor redirection



Page 1 of 2

Date	Revision	Checked
29-Nov-16	IRP - BRAG Report Summary Bars	n/a
	Originator - Stuart Shaw	
	Derived from CCC-500-NSXX-PM-SCH-00001	

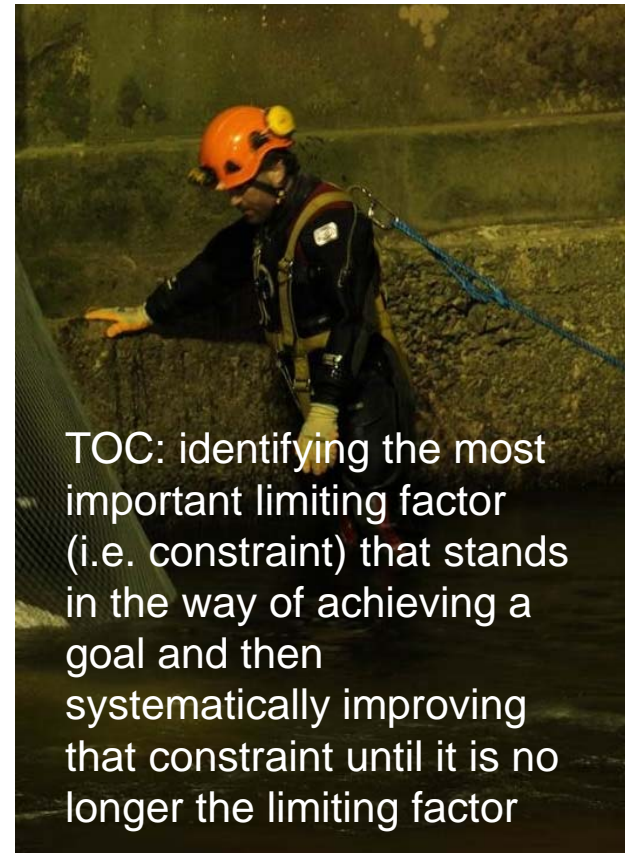
Managing Works Performance

Not creating a crisis

- The guiding light to works performance was
 - **'The Theory of Constraints'** - E.Goldratt

- **Keeping track of the leading indicators**

- **Monitoring:** we treated the first 6 months of the works as intense as a 'possession, shutdown..' – holding team members to account and supporting them to deliver to the critical path (emergent); on a daily basis



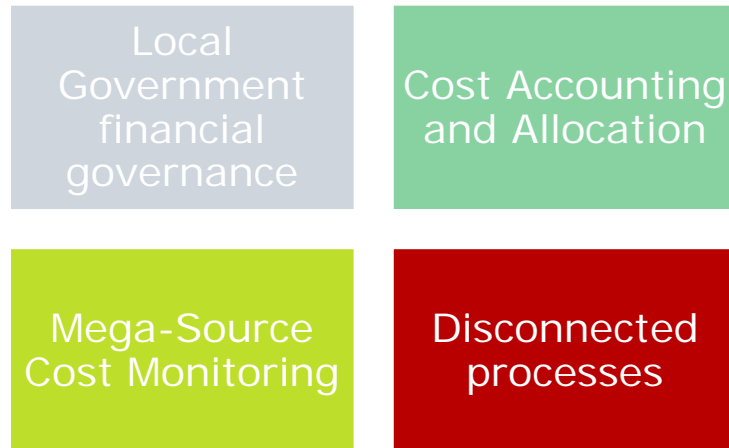
TOC: identifying the most important limiting factor (i.e. constraint) that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor

Costing the Rebuild – The Emergent Baseline

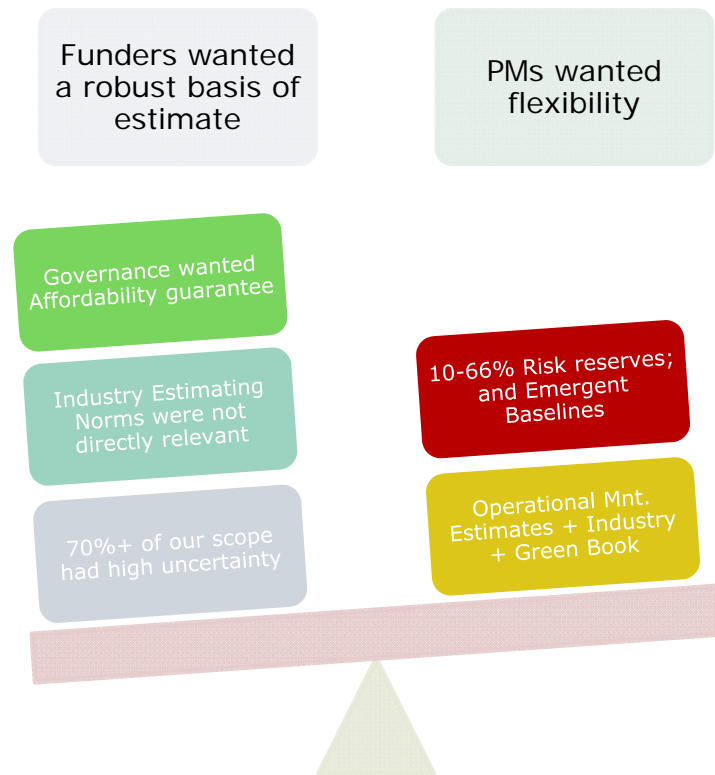


Funding

Challenges

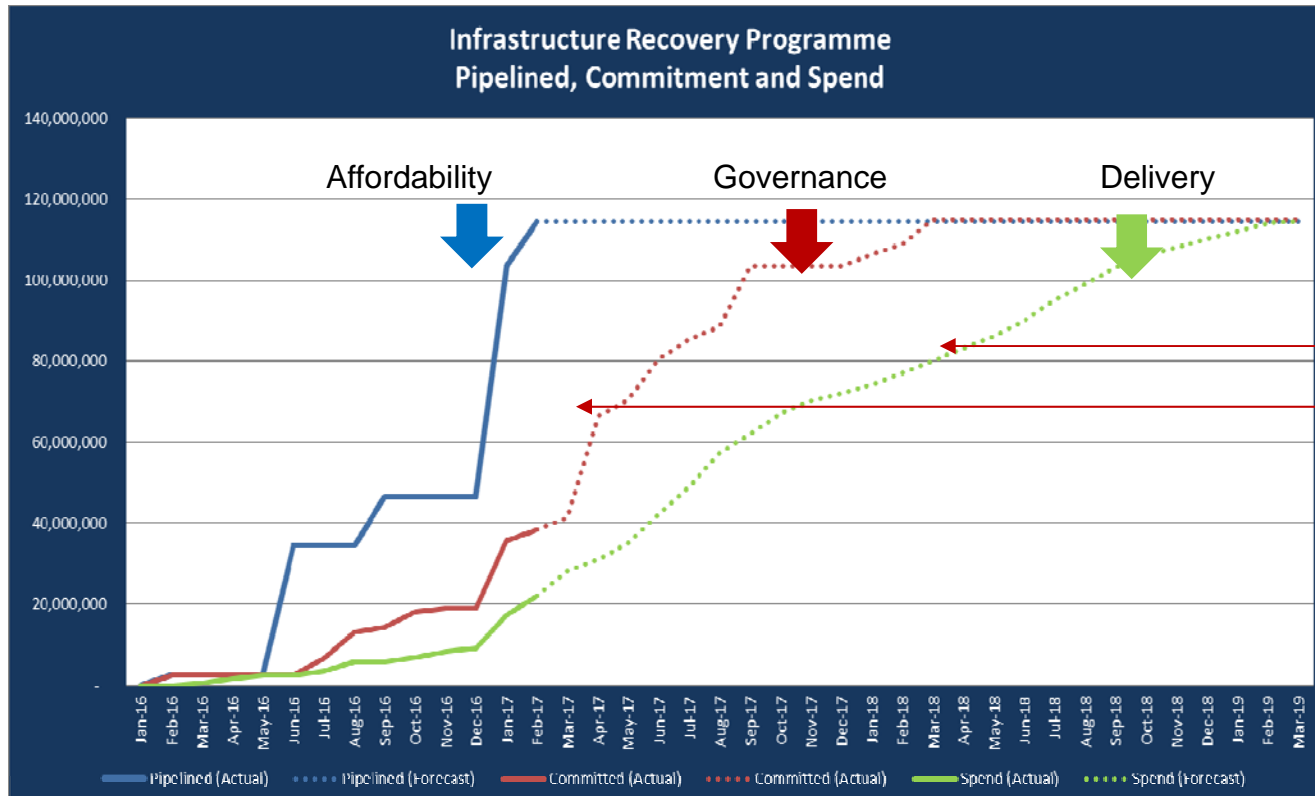


Scenario



Creating Space to Deliver

Effectively and Efficiently



Converting a disaster recovery and rebuild effort in to a stable baseline.

to learn and plan better

Creating Space to :

- Fail
- Change strategy
- Innovate
- Create legacy

Emergent Baseline - Summary



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Managing the data effectively

Leveraging technology

https://cirp-bi.myconnect.com/FinancialControl/Projectsheets/Details/56

Projectbook 4201 East - Work Package 3A & 3B

Projectsheets Details - Financial Summary

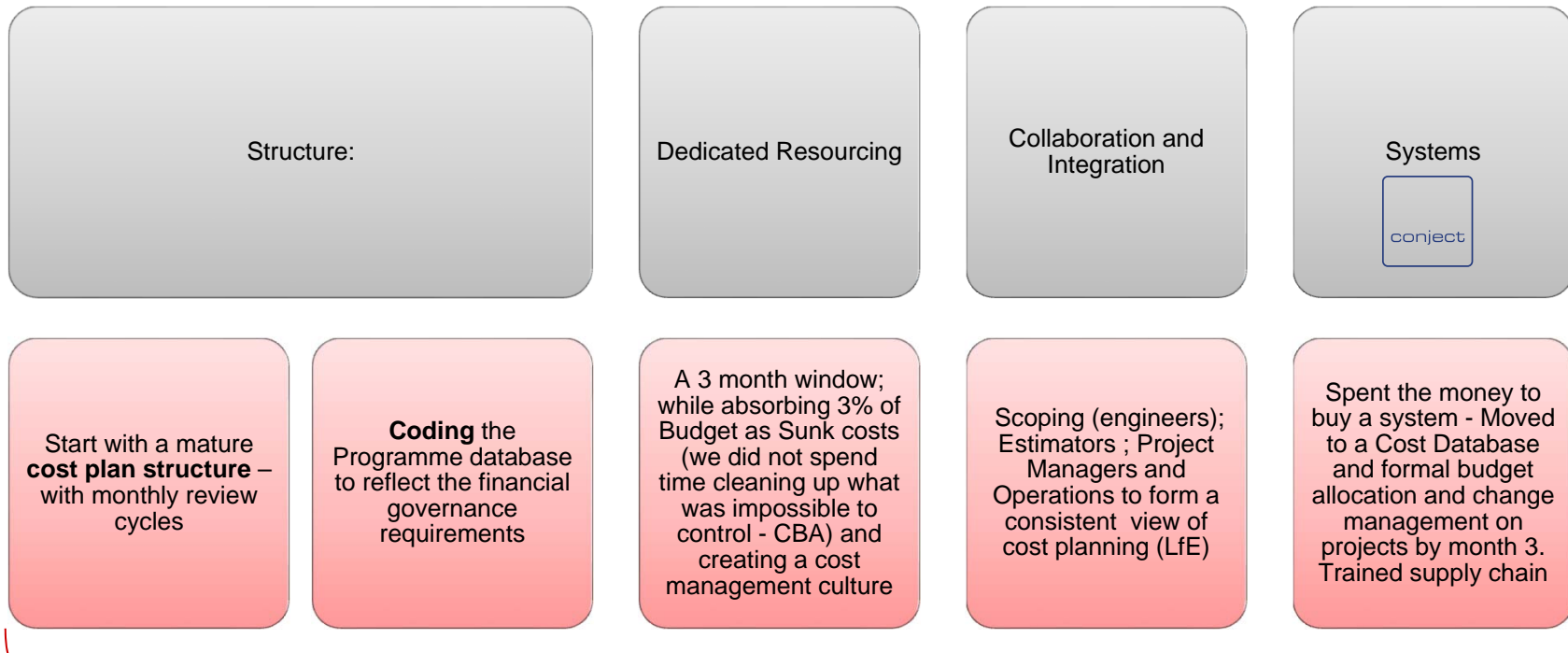
The Projectbook '4201 East - Work Package 3A & 3B' has been loaded.

Found 5 items

Cost Code	Description	Original Budget	Agreed Budget Changes	Approved Budget Transfers	Σ Current Budget	Original Contract Value	Agreed Instructions Or Change Orders	Σ Current Commitment	Remaining Budget	Potential Cost Changes	Applications To Date	Certified To Date	E5 Actuals	Accruals	Σ Actual Cost i Wor Performe
01-00-000-0-00-00000-00-000	Design	182,187.10	0.00	0.00	182,187.10	87,475.84	0.00	87,475.84	114,711.26	0.00	12,106.67	12,106.67	0.00	15,500.00	27,606.67
01 01-SRS-E-CA-S0041-HX-DIT	DIT	59,573.50	0.00	0.00	59,573.50	22,093.98	0.00	22,093.98	37,509.52	0.00	4,106.67	4,106.67	0.00	5,000.00	9,106.67
01 01-SRS-E-CA-S0042-HY-DFT	DFT	1,330.40	0.00	0.00	1,330.40	492.73	0.00	492.73	837.67	0.00	0.00	0.00	0.00	500.00	500.00
01 01-SRS-E-CA-S0043-HZ-DFT	DFT	121,283.20	0.00	0.00	121,283.20	44,919.13	0.00	44,919.13	76,364.07	0.00	8,000.00	8,000.00	0.00	10,000.00	18,000.00
02-00-000-0-00-00000-00-000	Delivery	1,583,781.58	0.00	0.00	1,583,781.58	0.00	0.00	0.00	1,583,781.58	0.00	0.00	0.00	0.00	0.00	0.00
02-01-SRS-E-CA-S0041-HX-DIT	DIT	517,881.98	0.00	0.00	517,881.98	0.00	0.00	0.00	517,881.98	0.00	0.00	0.00	0.00	0.00	0.00
02-01-SRS-E-CA-S0042-HY-DIT	DIT	11,595.38	0.00	0.00	11,595.38	0.00	0.00	0.00	11,595.38	0.00	0.00	0.00	0.00	0.00	0.00
02-01-SRS-E-CA-S0043-HZ-DIT	DIT	1,054,334.24	0.00	0.00	1,054,334.24	0.00	0.00	0.00	1,054,334.24	0.00	0.00	0.00	0.00	0.00	0.00
03-0-0-0-0-0-0-0	Regulatory Bodies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04-00-000-0-00-00000-00-000	Risk	284,895.30	0.00	0.00	284,895.30	10,121.38	0.00	10,121.38	254,773.92	0.00	0.00	0.00	0.00	0.00	0.00
04-0-0-0-0-0-0-0	Risk	284,895.30	0.00	0.00	284,895.30	10,121.38	0.00	10,121.38	254,773.92	0.00	0.00	0.00	0.00	0.00	0.00
05-00-000-0-00-00000-00-000	Unallocated Budget	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05-0-0-0-0-0-0-0	Unallocated Budget	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	2,030,863.98	0.00	0.00	2,030,863.98	77,597.22	0.00	77,597.22	1,953,266.76	0.00	12,106.67	12,106.67	0.00	15,500.00	27,606.67

Cost Planning and Performance –

The practical stuff



What we did

Governance and
Affordability

Control and Development

Efficiency

Communicating Performance – The Emergent Baseline



Reporting - Communicating with Intent

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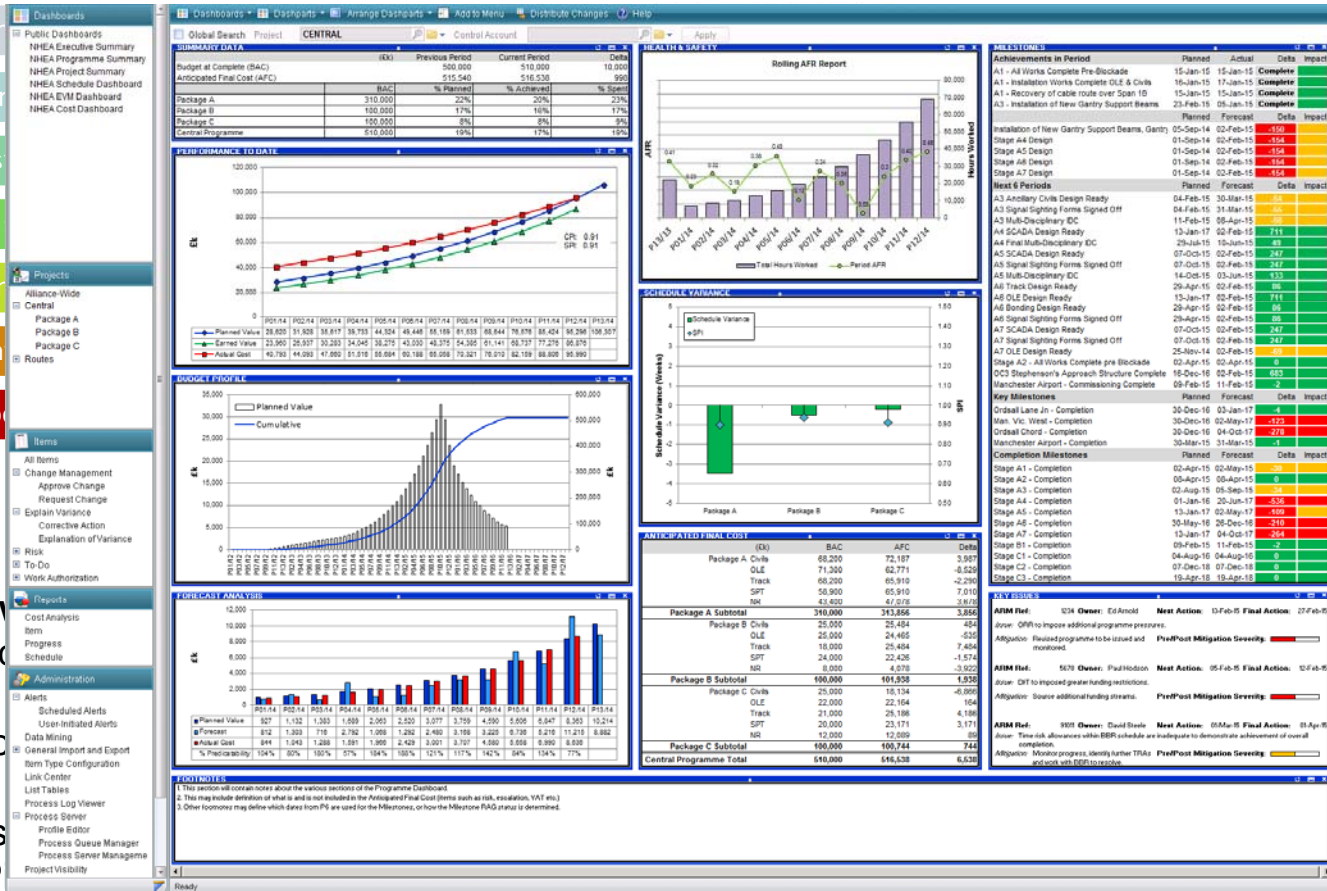
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Creating Common working methods

Getting it right 'first time' - Guidance and Training

Project Manager's Guidance Framework
CCC-5000-NSXXX-PM-TEM-00010



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1.	Executive Summary	5
Appendix A	Pre-Commencement Meeting Agenda / Minutes Template Ref. CCC-5000-NSXXX-PM-TEM-00003	6
Appendix B	ECC Project Manager's Commencement Checklist Template Ref. CCC-5000-NSXXX-PM-TEM-00008	11
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Appendix G	Opening Procedure for Closed Bridges Document Ref. CCC-1000-NSXXX-ST-PRO-00002	135
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Project Manager Transition Documents
CCC-1000-ALXXX-PM-REF-00001 Work Package Bridges West 16



2 Project Budget

The budget for this work package is controlled at an Asset level with a unique Finance Code attributed to it and therefore all Change, Payment Certificates, Cost Management etc. will require to be reported at Asset level. All suppliers are required to follow this structure.

This Work Package has been assigned the following budgets allocated per the respective Asset:

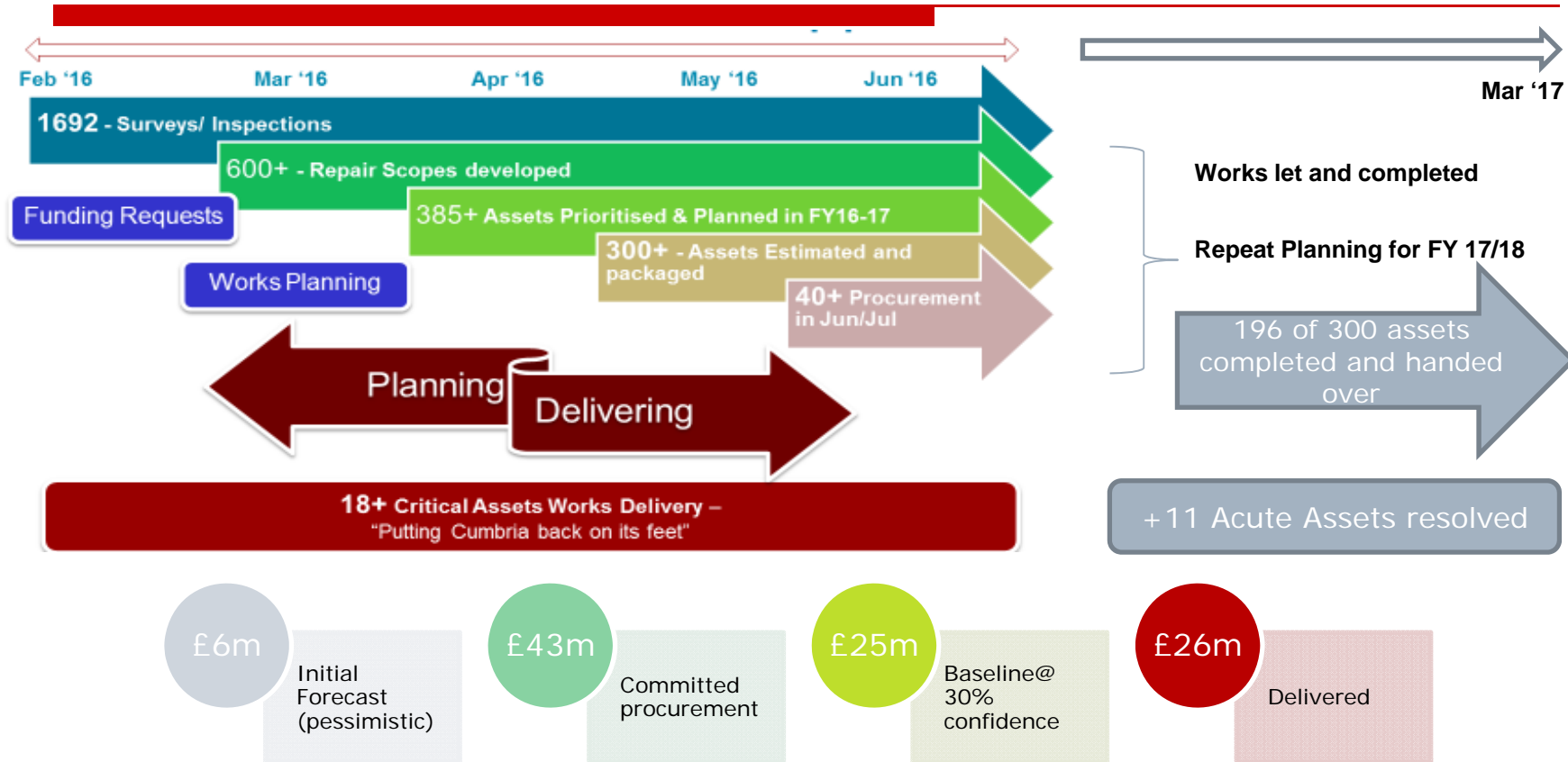
Asset Name	Finance Code	Value (£)
LEEGATE NEW	QPLQTEZ	18,214.80
LANGRIDGE	QPLQTEY	20,181.00
BECKSIDE	QPLQTEV	10,298.00
LEESONHALL	QPLQTFR	13,348.00
DRUM LANNING	QPLQTFD	11,801.00
STUBBS	QPLQTFE	10,363.10
ELLERCARR	QPLQTFG	10,007.00
IBRAH	QPLQTFH	10,074.00
OIL LORNING FORD FIB	QPLQTFJ	9,044.00
WATER SIDE FORD FIB	QPLQTFK	3,005.00
SPIRITALL FARM FIB	QPLQTFD	4,875.00
Total		143,702.90

There is additional funding available from the Project and programme risk allowance to cover any cost overruns and scope creep. To disambiguate the funds, a change control request must be agreed via the CRP governance.



The Outcome

What did we achieve



FY17/18 – 18/19 will see further execution of £40m pa

The Take Away – Emergent Baseline

Controlling a post-disaster rebuild

Get comfortable with ambiguity and leverage it

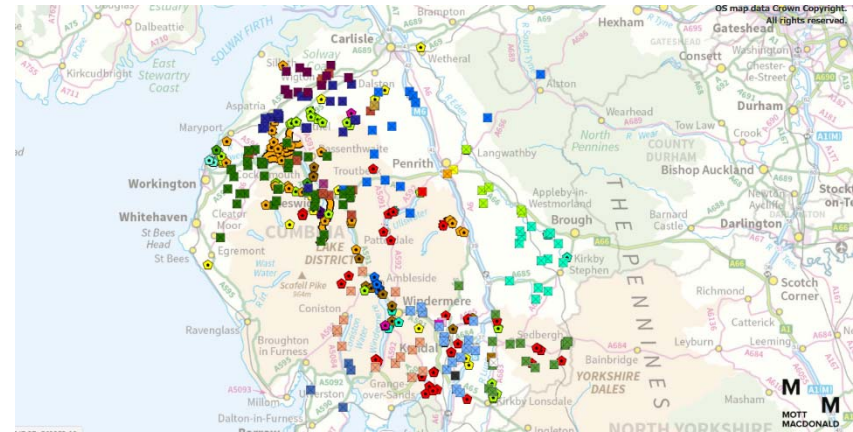
Get the team structure, systems setup
Processes will evolve, so start with good practice

Build consensus on emergent baseline; and take shortcuts

Use Sprints to drive delivery; and technology for efficiency and effectiveness

Forward Focus on the rebuild rather than reactive accounting/ crisis management

Questions?



Thank You

