

Performance of Contemporary Major & Mega Projects

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Research Context: The Megaproject Challenge

Critical Gap in Current Practice

- Limited empirical research on BRM for MMP
- Traditional evaluation frameworks focus narrowly on iron triangle metrics (cost, time, quality)
- Insufficient integration of benefit realisation methods into holistic project management

The Megaproject Imperative

- MMP projected to represent over 30% of global GDP within the next decade
- Climate change and sustainability challenges necessitate robust evaluation frameworks
- These 'change vehicles' require systematic approaches to value delivery assessment

Key Objectives

- Develop a validated Benefit Realisation Index (BRI) through rigorous methodological approaches
- Integrate benefit realisation methods into comprehensive project management frameworks
- Simplify complexity in issue resolution, demand control, and technique execution
- Enrich decision-making procedures for optimising benefits in large-scale projects



Methodological Framework

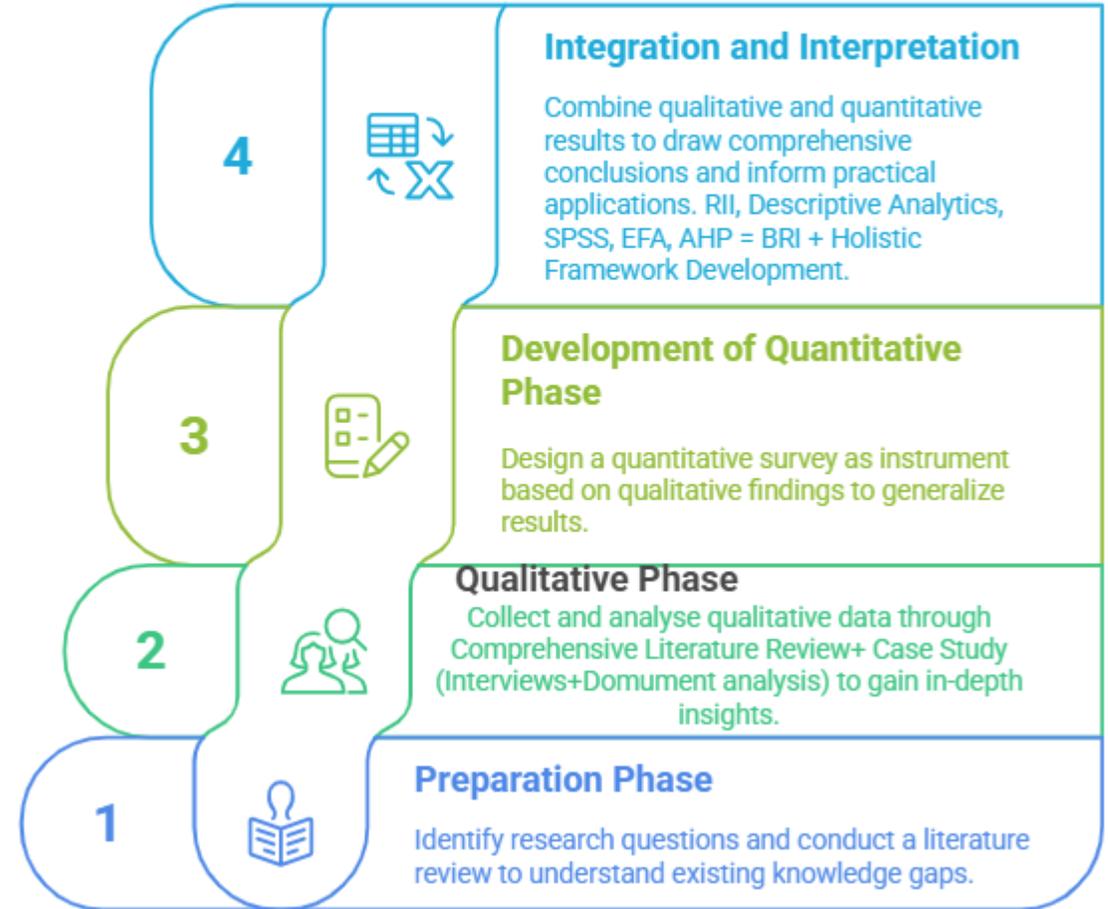
Sequential Explorative Triangulation (SET) Approach

- Nine fundamental steps ensuring methodological rigour
- Mixed-methods design combining qualitative exploration with quantitative validation

Quantitative Validation Techniques

- **SPSS (Statistical Software Package)**
 - SPSS for KMO and Barlett test for sample adequacy
 - Survey (Likert Scale)
 - (Batch testing over 4 intervals)
- **Exploratory Factor Analysis (EFA)**
 - EFA Analysis for Factor Reduction.
 - Reduces complexity whilst identifying latent factor structures
 - Final Factor Synthesis and Naming
- **Analytic Hierarchy Process (AHP)**
 - Expert pairwise comparisons using Saaty's 1-9 scale
 - Validation panel: 77 years collective industry experience

Steps in Explorative Sequential Research

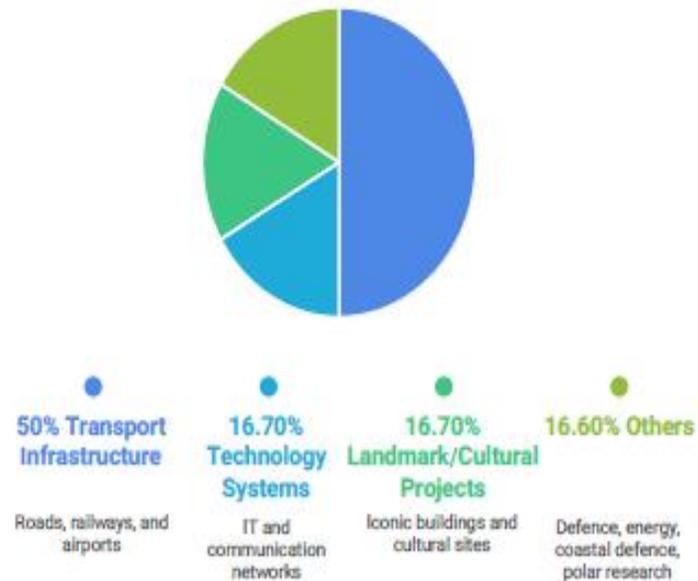


Research Process: Sequential Phases

Phase 1: Preliminary Review = (n=12 Case Reviews)

—£87.3 billion investment

Distribution of UK Megaproject Investment (1974-2024)



- Contemporary Iron Triangle (CIT) vs Iron Triangle Barnes' (1969)

***Chatelier et al.,(2020)/Springer Publication.*

- Variance Formula and Statistical Evidence

mathematical representation: $CV\uparrow + QV\downarrow + TV\uparrow/\downarrow = UC\downarrow R\downarrow$.

- Quality Correction

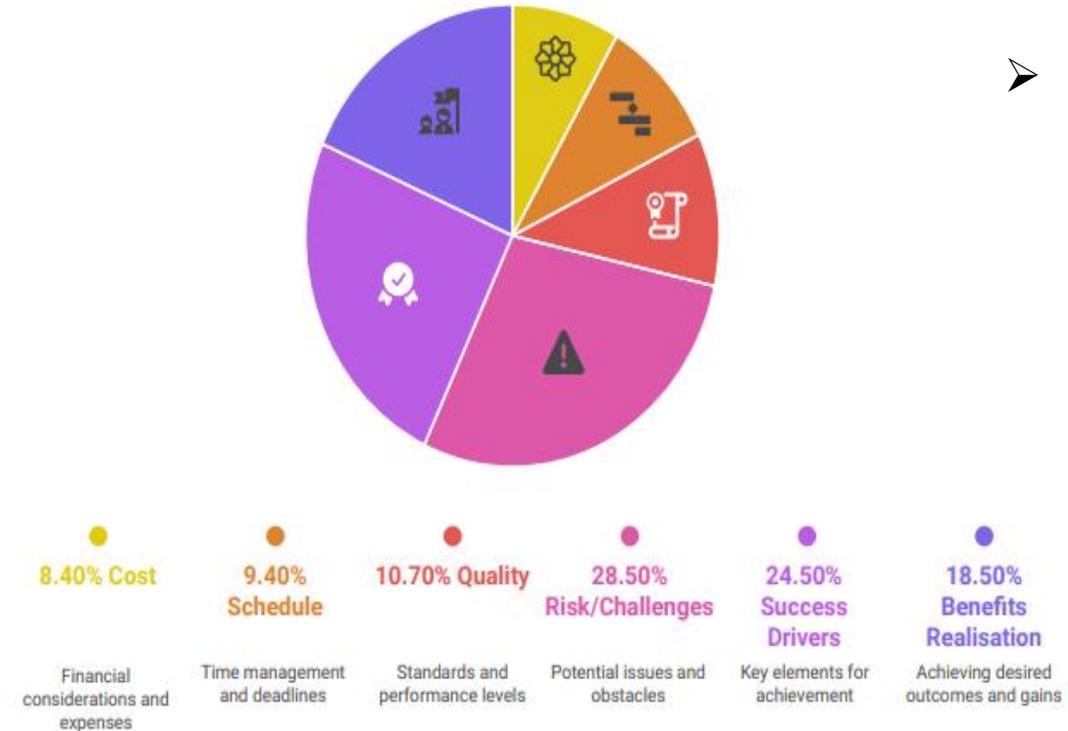
statistically significant despite small sample constraints ($\chi^2=12.00$, $p<0.001$; Fisher's exact test $p=0.001$).

- A Call to Reconceptualise/Reclassify Success



Phase 2: Literature Foundation = over 298 factors

Comprehensive literature review synthesised from 2012-2022,



- Literature delineates seven distinctive features setting megaprojects apart from traditional projects.
- Confirms that subjectivity significantly affects performance evaluation practices.
- The Project Management Paradox.



Phase 3: Explorative Case Studies = 3x (Comprehensive Studies)

Success Factor	RRS Sir David Attenborough	Typical Megaproject Challenge (e.g., Crossrail)	Ottawa Light Rail Transit (OLRT)
Requirements Stability	Frozen early (post-Rev I, pre-14 Nov tender), minimal changes	Scope creep, cascading changes (£800M+ impact typical)	Design-to-budget approach; political constraints; scope frozen at CAD \$2.1B despite Class D estimate ±25% accuracy
Stakeholder Complexity	Concentrated (5-10 primary: NERC, BAS, Cammell Laird, Rolls-Royce, Houlder, PMO, UKSBS)	Fragmented (100+ entities typical for major infrastructure)	Highly fragmented (federal, provincial, municipal agencies; RTG consortium; Infrastructure Ontario; multiple oversight bodies; limited local technical capacity)
Contract Structure	Integrated design-build (single accountability, Rolls-Royce + Cammell Laird partnership)	Multiple packages (36+ contracts typical, interface complexity)	P3/PPP model (Design-Build-Finance-Maintain; 30-year maintenance obligation; complex multi-party accountability; risk transfer failed)
Risk Assessment Approach	Simple, transparent (3-point on critical path, risk funnel classification)	Complex tools (QRA, Monte Carlo, multiple integrated systems)	Complex theoretical model with overstated risk transfer; CAD \$450M+ public exposure retained despite PPP promises; value-for-money analysis flawed
Technology Strategy	Proven, incremental (Rolls-Royce track record, Bergen engines, Promas evolution, twin skeg validation)	Novel, integration challenges (unproven systems, interface risks)	Unproven customisation (Alstom Citadis trains not tested in Ottawa climate; custom specifications; integration failures; derailments; chronic reliability issues)

Phase 4: Thematic Analysis and Survey Construction Responses = (n=105 valid responses)

- Thematic grouping into benefit categories -75 Critical Factors under review, Lickert Scale (1-5)

** KMO & Spherity Tests

Phase 5: Statistical Reduction (EFA + AHP)

- EFA: Identified latent factor structures and composite indices
- AHP: Expert pairwise comparisons for priority rankings

*** validation established final 24 composite indices for Frameworks****

- Result: 24 validated composite indices (7 dimensions)
- BRI and Holistic Framework.

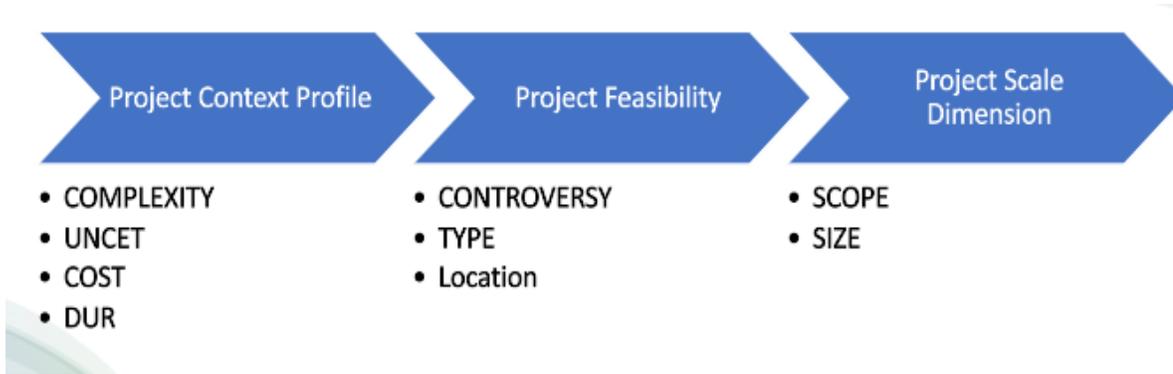


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Benefit Classifications: A Holistic Approach

Four Primary Dimensions with **24 Composite Indices**

•(MMP) PC-Factors: 3 Indices, 9 categories,



Based on your pairwise comparisons:

Cat	Priority	Rank	(+)	(-)	
1	PFI	58.4%	1	13.4%	13.4%
2	PCP	23.2%	2	5.3%	5.3%
3	PSD	18.4%	3	4.2%	4.2%

Priorities

These are the resulting weights for the criteria based on your pairwise comparisons:

Cat	Priority	Rank	(+)	(-)	
1	COMPX	50.3%	1	5.3%	5.3%
2	UNCET	29.0%	2	2.8%	2.8%
3	COST	15.5%	3	0.9%	0.9%
4	DUR	5.2%	4	0.3%	0.3%

Quality Benefits (Qua-Ben): 3 Composite Indices



Project Impact and Compliance Score

Satisfaction of local and extended demand
Technical Performance aligned with design expectations/requirements
Engagement with External Governing + Regulatory Bodies
Improved Flexibility and Mobility
Providing ease of access to product/service



Project Safety and Comfort Index

Improved level of comfort and convenience
Responsibility to comply with safety regulation



Sustainable Market Expansion Index

Minimise long-term maintenance cost
Build presence in existing and new markets

Time Benefits (Time-Ben): 2 Composite Indices

TIME FACTORS = 2x Factors

Project Time Management and Efficiency Score

- Time efficiency for end user
- On time project delivery
- Timely payments (contractors/supply chain)
- Commitment and adhering to time schedules

Societal Response and Service Efficiency Index

- Response Time (contingency planning in emergency)
- Providing timelier and more convenient service/society



Cost Benefits (Cost-Ben): 4 Composite Indices

	<h3>Financial Efficiency and Compliance Index</h3>	<ul style="list-style-type: none"> Minimise long-term maintenance cost Requirement to complete within budget Financial Optimum Bias (Initial stages of project) Requirement to complete within the budget
	<h3>Economic Impact and Cost Management Index</h3>	<ul style="list-style-type: none"> Wider economic impacts Realistic and Effective Cost Estimate + Quantification practices Evaluation of Project Cost post delivery
	<h3>Operational Efficiency and Cost Alignment Index</h3>	<ul style="list-style-type: none"> Increase operational efficiency Project cost alignment with overall programming
	<h3>Strategic Alignment and Capability Index</h3>	<ul style="list-style-type: none"> Minimise long-term maintenance costs Build presence in existing and new markets

Other Benefits (Oth-BEN): 4 Composite Indices

	<h3>Sustainable Innovation and Collaboration Index</h3>	<ul style="list-style-type: none"> Reduced Emissions for Air, Congestion and Pollution Development of Knowledge and Megaproject Innovation Effective technology integration and innovation (Example BIM) Skills and facilities sharing between public and private sectors
	<h3>Cultural Planning and Environmental Sustainability</h3>	<ul style="list-style-type: none"> Landscape and Townscape Heritage of historic resources Sustainability (Art and Archaeology) Increased Ambience
	<h3>Public Welfare/engagement and Environmental responsibility Index</h3>	<ul style="list-style-type: none"> Minimise Environmental Impact Grater public Engagement Project's contribution of the public's prosperity
	<h3>Integrated Policy and Workforce Motivation Index</h3>	<ul style="list-style-type: none"> Policy Integration (Land-use, Govt, Transport Interchange). Intrinsic employee motivation (creating a sense of belonging)



Risk Barriers and Opportunity Drivers

Risk and Barrier Factors (4 Composite Indices)

- Projects Integrity and Resource Management Index
- Strategic Risk and Supply Management Index
- Project Execution and Reputation Index
- Digital, Environmental, and Safety Management Index

Driver and Opportunity Factors (4 Composite Indices)

- Resource Optimisation and Technological Implementation
- Governance, Adaptability, and Leadership Excellence
- Value, Risk and Benefit Impact Integration
- Cultural Integration and Planning Excellence



Break Slide

The Benefit Realisation Index (BRI)

Key Characteristics

- **Composite measurement instrument** integrating 24 validated indices
- **Real-time classification system** enabling dynamic benefit tracking
- **AHP-weighted priorities** allowing project-specific customisation
- **Normalised 0-100 scale** facilitating cross-project comparisons

Operational Framework

- Simplifies complexity in issue resolution and demand control
- Enriches decision-making through comprehensive value assessment
- Optimises benefit delivery throughout project lifecycles

Validation Results: Expert Assessment Expert Panel Characteristics

- Expert practitioners across rail, infrastructure, oil & gas, clinical, and academic sectors
- 77 years of collective industry experience

Framework Assessment Scores (Likert Scale 1-5)

(1=least and 5-most significant)

Average Scores ratings!!

- **Effectiveness:** 4.4
- **Comprehensiveness:** 4.6
- **Clarity:** 4.2
- **Simplicity/Usability:** 3.8
- **Adaptability:** 4.5

Overall Industry Application: 4.3



Key Innovations and Contributions

Theoretical Contributions

- Extends benefit realisation management theory specifically for megaproject contexts
- Challenges traditional iron triangle evaluation with validated alternative framework
- Integrates risk and benefit management into unified assessment framework

Methodological Innovations

- Sequential Explorative Triangulation combining qualitative depth with quantitative rigour
- Dual validation through EFA and AHP, ensuring statistical and practical validity

Practical Contributions

- Validated measurement instruments for systematic benefit tracking
- Real-time decision support throughout project lifecycles

Implications for Theory and Practice

Academic Implications

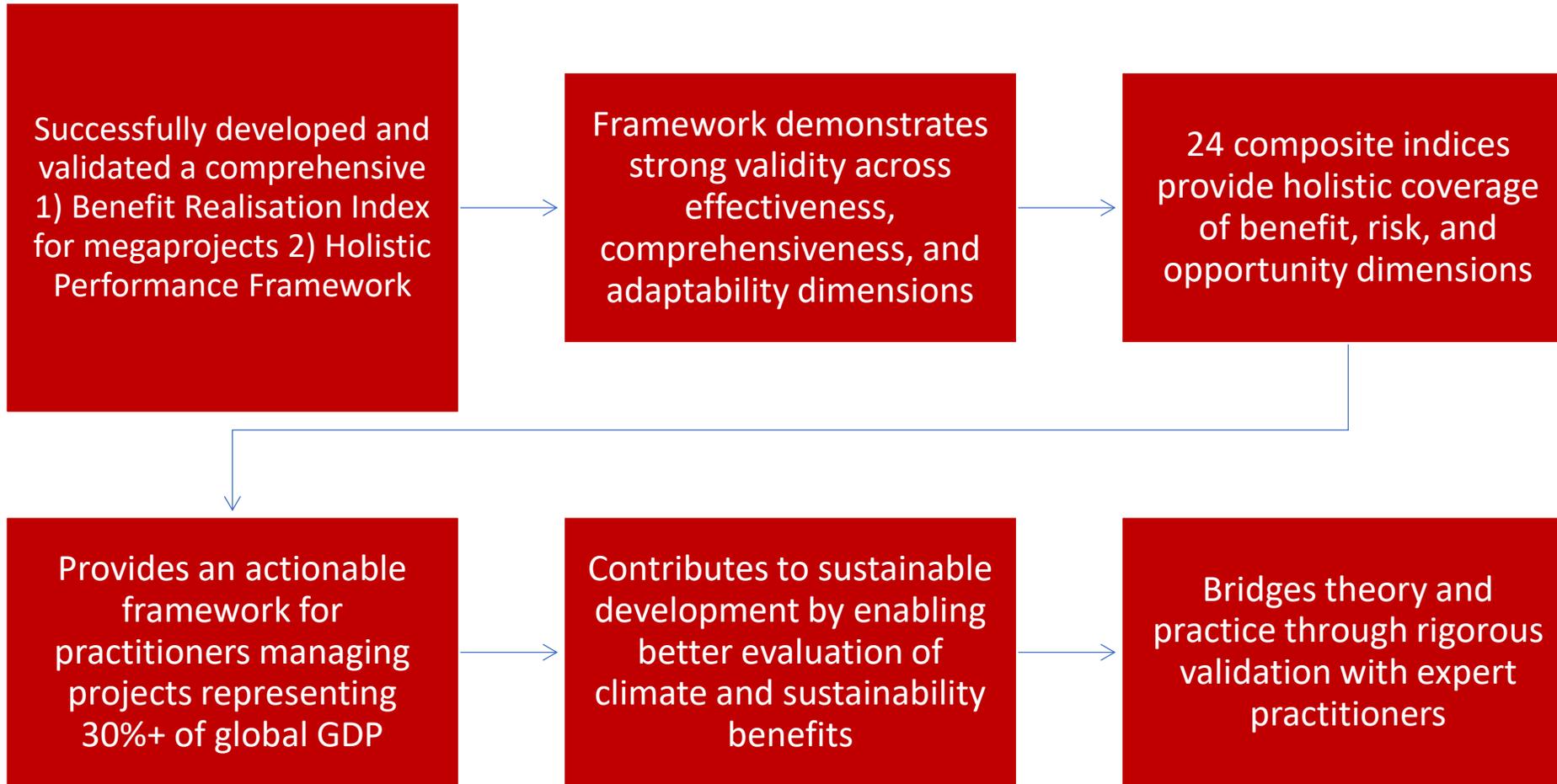
- Provides empirical foundation for benefit realisation theory in megaproject contexts
- Demonstrates practical application of mixed-methods research in project management
- Establishes validated measurement instruments for future research

Practitioner Implications

- Enables systematic benefit tracking from project inception through post-delivery
- Supports evidence-based decision-making for benefit optimisation
- Facilitates stakeholder communication through comprehensive value assessment
- Compatible with existing PM standards (ARM, PRINCE2, PMI, ISO 21502)



Conclusions



As a PM Expert Your Opinions Matters!

**For feedback and your interest to Trail the
Framework/s please contact:**

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**Thank
You**