ROADS PAVEMENT FORUM
SANRAL RESEARCH/INNOVATION

9 APRIL 2025

SANRAL

BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

RESEARCH & INNOVATION PROGRAMME BACKGROUND

SANRAL

BUILDING SOUTH AFRICA THROUGH BETTER ROADS

BACKGROUND

- 16 research focus areas

Research Focus Area 1	Asset Management
Research Focus Area 2	Geotechnical
Research Focus Area 3	Future Transportation
Research Focus Area 4	Pavements
Research Focus Area 5	Drainage & Hydraulics
Research Focus Area 6	Structures
Research Focus Area 7	Traffic
Research Focus Area 8	Road Safety
Research Focus Area 9	Transportation Planning
Research Focus Area 10	Environment
Research Focus Area 11	Communications
Research Focus Area 12	Public Administration & Management
Research Focus Area 13	Economics
Research Focus Area 14	Legislation
Research Focus Area 15	Technical Innovation
Research Focus Area 16	Electrical/Mechanical

RESEARCH PROJECTS OVERVIEW

STATUS	Count of STATUS
IN PROGRESS	15
COMPLETED	12
PROJECT PROPOSAL RECEIVED	7
APPROVED BY RIAC	4
CANCELLED	1
PROJECT PROPOSAL PENDING	1
Grand Total	**40**

Actual investment to date is R109 879 618.00

RFA 4 - PAVEMENTS

- Current projects

  3.11 Rural road planning

  3.2 Advanced asphalt technology

  3.3 Advanced bituminous binder technology

  3.5 Unbound materials testing and design

  3.6 Alternative and innovative materials

  3.8 Accelerated pavement testing and long-term pavement performance

- New projects – project proposal in progress

  4.1 Asphalt QA/QC pro-active testing rather than reactive testing during construction

  4.2 Waste materials in Asphalt

  4.3 PG Binder Specifications

PROJECTS

RESEARCH FOCUS AREA 4		PAVEMENTS
1002-58600-2018 – P3.2 Advanced asphalt technology	19 APRIL 2021	The objective of this research project is to develop improved performance models for permanent deformation and fatigue based on advanced asphalt technologies. These models will be used in road pavement analysis to predict the structural response of the road pavement system and the service life of asphalt surfacing's and base courses. The models will accurately simulate the effects of changes in the material during the life of pavements on the response of the material. Specifically, this project intends to achieve the following objectives: • To develop improved transfer functions for design of road pavements to prevent cracking and deformation. • To provide input into the updating of relevant design manuals • To improve asphalt mix design procedures with new models for aggregate packing and compaction of asphalt • Explore and evaluate the use of innovative and sustainable non-conventional materials in pavement structures with emphasis given to fly ash, demolition waste, recycled concrete, mining waste, waste oils, and crushed glass. • Develop life cycle assessment frameworks for the roads incorporating non-conventional materials

PROJECTS CONTINUE

RESEARCH FOCUS AREA 4		PAVEMENTS
1002-58600-2018 – P3.3 Advanced bituminous binder technology	23 NOV 2021	The main objective of this project is to improve the testing and design of bituminous binders for use in this seals and asphalt. In particular, the following aspects will be addressed: • Improved methods for recovering bitumen from asphalt for accurate testing of the binder including improved safety of technicians; • Investigating the effect of ageing on the engineering properties of bitumen and how that will impact is strength and life (using advanced equipment such as the dynamic shear rheometer (DSR). This will include standard bitumen's as well as polymer modified binders. The effect of construction at high temperature as well as the effect of long-term climate changes will be simulated; • Investigating cohesion, adhesion and compatibility of materials in binder-aggregate systems to improve design models and hence performance of asphalt mixes; • To identify, validate and implement fundamental compatibility models for selection of binder-aggregate systems and improve associated test methods; • Evaluation of the South African performance graded binder specification with regards to field performance and improve specification limits; • To develop an understanding of mastic properties and how these properties relate to overall asphalt mix performance; • To develop an understanding of the uses of and engineering properties of alternative binders (alternative to expensive bitumen); and • Establishing chemical composition as opposed to physical properties as a criterion for bitumen selection.

PROJECTS CONTINUE

RESEARCH FOCUS AREA 4	PAVEMENTS
1002-58600-2018 – P3.3 Advanced bituminous binder technology	The main objective of this project is to improve the testing and design of bituminous binders for use in this seals and asphalt. In particular, the following aspects will be addressed: • Improved methods for recovering bitumen from asphalt for accurate testing of the binder including improved safety of technicians • Investigating the effect of ageing on the engineering properties of bitumen and how that will impact is strength and life (using advanced equipment such as the dynamic shear rheometer (DSR). This will include standard bitumen as well as polymer modified binders. The effect of construction at high temperature as well as the effect of long-term climate changes will be simulated. • Investigating cohesion, adhesion and compatibility of materials in binder-aggregate systems to improve design models and hence performance of asphalt mixes • To identify, validate and implement fundamental compatibility models for selection of binder-aggregate systems and improve associated test methods • Evaluation of the South African performance graded binder specification with regards to field performance and improve specification limits • To develop an understanding of mastic properties and how these properties relate to overall asphalt mix performance • To develop an understanding of the uses of and engineering properties of alternative binders (alternative to expensive bitumen) • Establishing chemical composition as opposed to physical properties as a criterion for bitumen selection

PROJECTS CONTINUE

RESEARCH FOCUS AREA 4	PAVEMENTS
1002-58600-2018 – P3.5 Unbound materials testing and design	The performance of pavements depends largely on the characteristics of aggregate materials both crushed and naturally occurring. Complete and accurate quantification of these properties is therefore essential for understanding their influence on pavements and their susceptibility to failure. This will lead to improved selection of aggregates and granular materials that will produce longer lasting pavements. Specific objectives are: •To develop alternative tests and limits for the improved performance-based characterisation and classification of unbound materials and their stabilised derivatives. •Development of test protocols and evaluation procedures for granular material layers. •Development of a better understanding of pavement performance and the systemic factors that contribute to failure of pavements. •Investigation of the enhancement of grading specifications •Assessing the relevance and importance of the CBR test for classification and characterisation of unbound materials.
1002-58600-2018 – P3.6 Alternative and innovative materials	The unit cost of the provision of road infrastructure using current technology makes it difficult to meet service delivery demands. The implementation of new-age nanotechnologies can make a substantial impact to reduce these unit costs, making service delivery an achievable objective given the available funds, without compromising the integrity of the end-product. Good quality road building materials are both costly and becoming scarce and pavement engineers have to investigate the use of marginal and alternative materials that can be upgraded to base and subbase standard. The nano-technology field provides a technology platform for the improvement of the engineering properties of such materials, especially to: •Water-proof these materials that are high susceptible to water ingress, and •Improve the strength of the materials to such an extent that they can be used in the structural layers of a pavement. The work will include extensive laboratory and field (accelerated trafficking) testing of materials available in the industry with the objective to develop a design manual und application manual for the use of these materials, thus making a wider selection of cost -effective materials available to authorities and designers.

PROJECTS CONTINUE

RESEARCH FOCUS AREA 4	PAVEMENTS
1002-58600-2018 – P3.8 Accelerated pavement testing and long-term pavement performance	Accelerated Pavement Testing (APT) and Long-term Pavement Performance (LTPP) studies form an important part of proof testing of new designs and materials and has been shown to effect significant benefit cost ratio's of up to 12:1. It is therefore vital that new designs and materials be evaluated through field-testing to optimize the innovation and prevent costly early failures. The South African APT programme has a long history of success both locally and internationally and the historic data from this programme can provide an added benefit to this project. The project aims to enhance the knowledge in both APT and LTPP through: • Developing advanced protocols for APT and LTPP; • Improvement of APT and LTPP data bases; • Improvement of data mining processes and protocols; • To develop a comprehensive LTPP programme in SA; • Develop methods for combined analysis of APT and LTPP data, including developing processes, hubs and platforms that help road agencies fast-track research findings from APT and LTPP studies into large-scale implementation; • Design and build an advanced, high-speed APT device (the traffic stream simulator, TSS) prototype and evaluate its performance to strength the South African APT programme; • Investigate the potential for using 4IR technologies (e.g. remote/embedded sensors) to monitor pavement performance under APT and LTPP and provide guidelines for their use; and • Use the APT / LTPP data to develop and/or revise pavement performance models and design processes.

PROJECTS CONTINUE

RESEARCH FOCUS AREA 4	PAVEMENTS
1002-58600-2018 – P3.11 Upgrading & improving prioritisation of gravel roads	There is no single document applicable to South African conditions that guides the roads industry to identify, prioritise, design, maintain and manage the unsealed road network. Although information is available, with some guidelines developed for low volume sealed roads, it is either outdated and/or not necessarily focussed on the South African environment. In the light of national priorities, it is now vital to establish a comprehensive protocol for upgrading low volume roads. This will be achieved through: •Development of Technical Guidelines applying economic principles to prioritise the network of rural gravel/earth roads for upgrade to surfaced standards; •Development of Technical Guidelines on best practice and new technologies (i.e. nano stabilisation) that reduce the cost to upgrade gravel/earth roads to surfaced standards; •Mapping and classification of the gravel/earth road network to inform the prioritisation schedule for gravel/earth roads upgrading; •Customisation and implementation of models to prioritise potential projects for short-to-medium-term asset management plans and for use in strategic planning at the network level; •Developing appropriate design standards for the improvement of naturally available materials using novel and traditional stabilisation options that are proven to be both cost-effective and technically effective (short-term implementation for upgrades over the medium term); •Developing best practice guidelines for sustainable construction and maintenance technologies for implementation in the South African environment to maximise job creation and the development of SMMEs (short-term implementation for upgrades over the medium term); •Incorporating options for identification and evaluation of appropriate forms of contract and select the most appropriate for South Africa (short-term implementation for upgrades over the medium term); •Monitoring the implementation of the design, and contractual documentation and construction on the identified 7 pilot projects (as identified by the PICC) to identify shortcomings and improvements to the documentation; •Updating and finalising the documentation where required, and •Assisting in the national implementation of the programme to upgrade of gravel/earth roads.

POLICIES

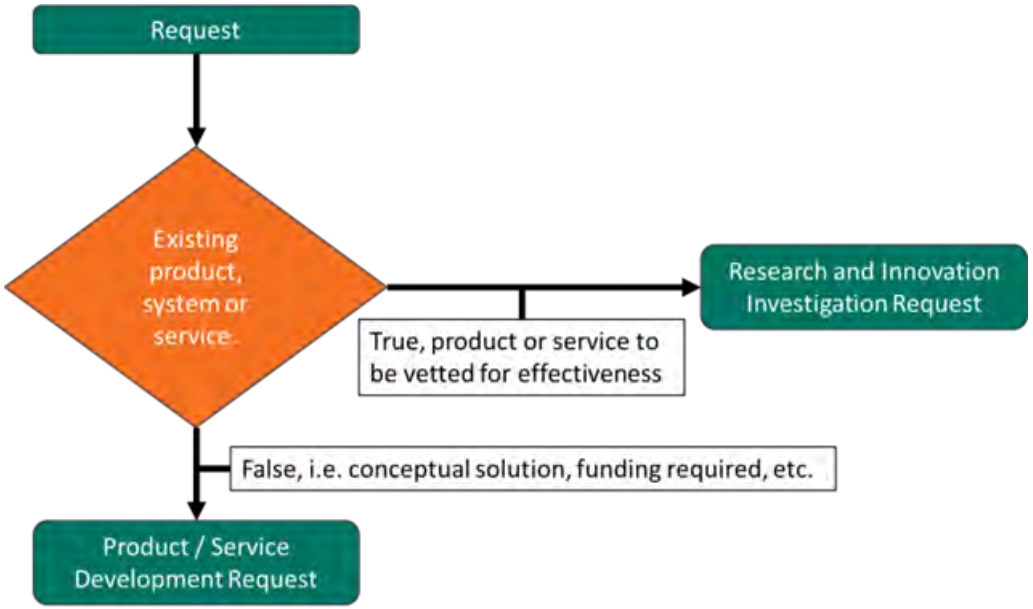
- Research and Innovation Policy governs the following:
  - The set of research priorities and the approval by EXCO;
  - The appointment of a research panel;
  - The participation of Maters and Phd students;
    - “The research panel will include research Master’s and PHD students enrolled at public South African Universities. Universities will be required to focus on designated group(s) meaning black people, women and people with disability who are citizens of the Republic of South Africa by birth or descent or became citizens of the Republic of South Africa by naturalization before 27 April 1994 or after 26 April 1994 and would have been entitled to acquire citizenship by naturalization prior to that date but who were precluded by Apartheid policies”.

RESEARCH PANEL

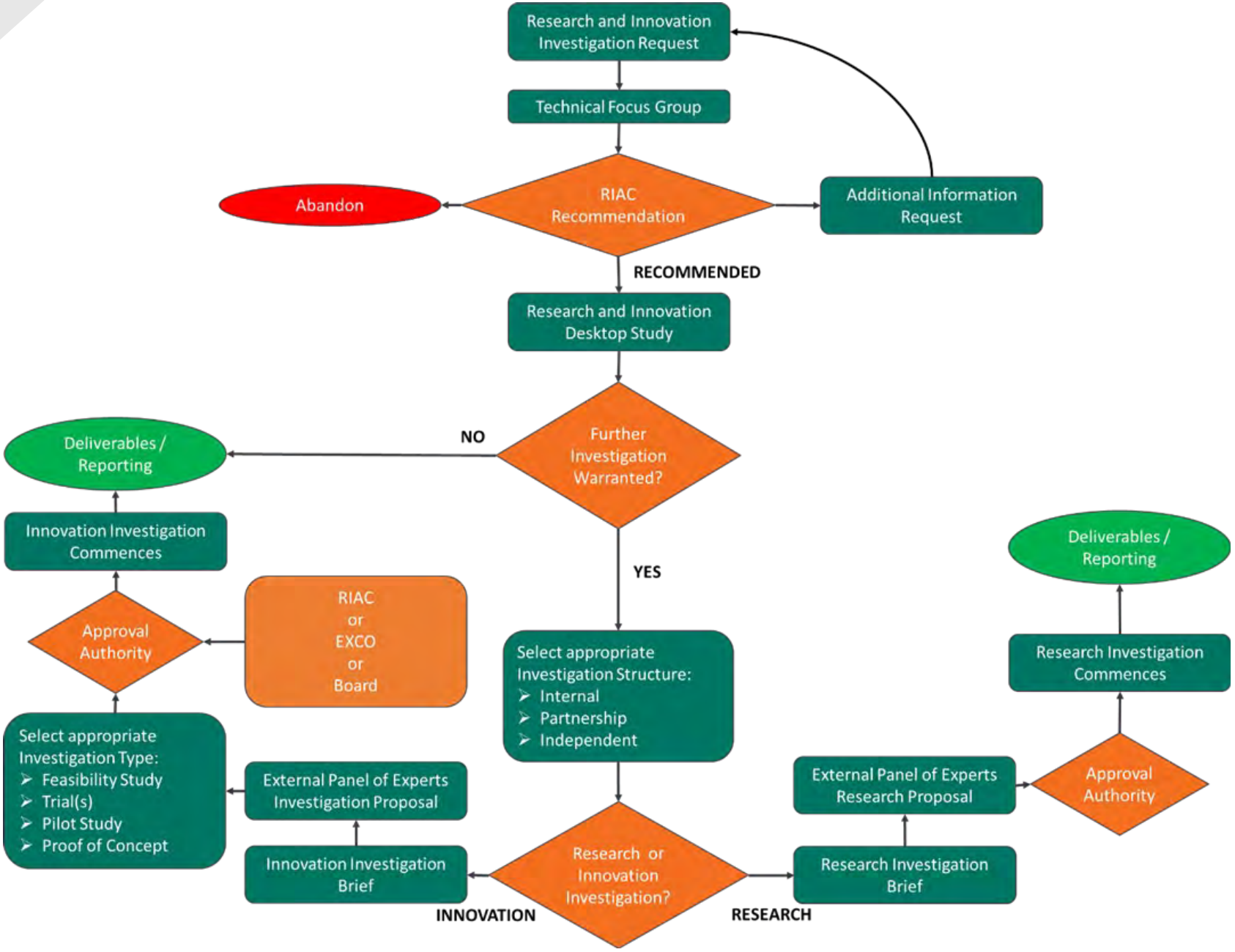
- RFI – Research panel – RFI, open tender process and evaluation of tenders according to a QBS method as approved by National Treasury
- All successful tenderers serve on a research panel according to speciality area
- Fixed rates according to categories
- 16 research focus areas
- Research input to COTO manuals and guidelines
- Sharing of knowledge and outcomes:
  - KMS and Tshebo T2 – experts on demand
  - Research Colloquium

POLICIES

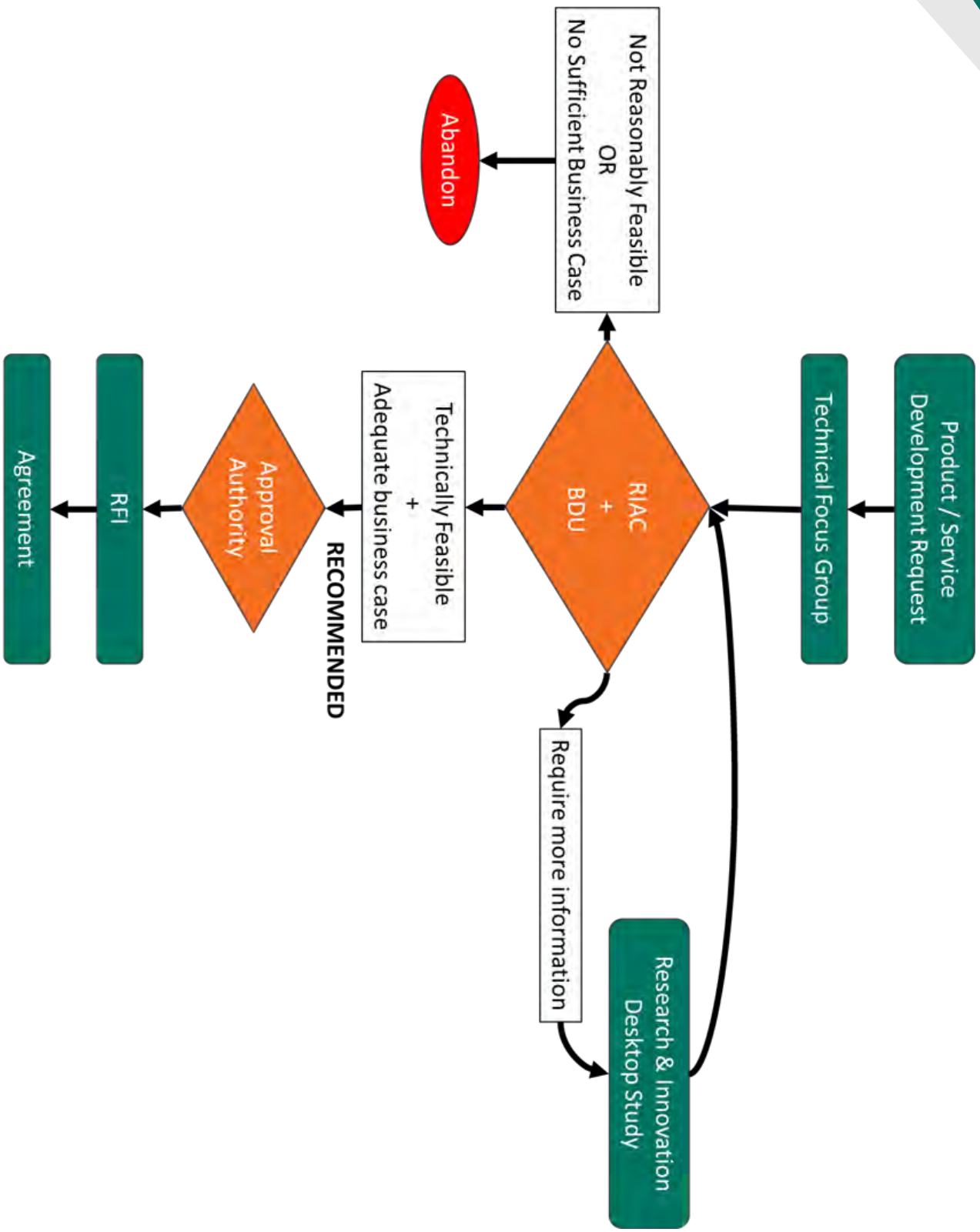
- The Research/Innovation investigations and Product/Services development policy governs the following
  - aims to provide guidance to all business units within SANRAL regarding research & innovation investigations and product/service development and two requests can be made:
    - These are a **Research/Innovation Investigation Request (RIIR**) and a **Product/Service Development Request (PSDR)** respectively,



POLICIES CONT - RESEARCH/INNOVATION INVESTIGATON



POLICIES CONT - PRODUCT/SERVICES DEVELOPMENT



POLICIES - APPROVAL

Research Impact Assessment Committee (RIAC)	Investigatory
SANRAL Executive Committee (EXCO)	Immediate implications for SANRAL
SANRAL Board and Minister of Transport	Immediate implications for sector and industry

Questions?