هيئة تنمية البحث
والتطوير والابتكار
Research Development
and Innovation Authority

Reactivating & Rebuilding of Existing Labs Initiative

Project-level Funding

Guidelines Document

Stable and Sustainable R&D Funding

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Overview

The Research, Development, and Innovation Authority (RDIA) in KSA is committed to promoting scientific research and innovation to drive economic growth and improve the quality of life. RDIA seeks to provide researchers in KSA with the necessary resources and support to conduct cutting-edge research that addresses the four national aspirations and priorities for RDI namely, Health & Wellness, Sustainability and Essential Needs, Energy and Industrials, and Economies of the Future.

The funding programs of RDIA provide advantages that go beyond the boundaries of the scientific realm in Saudi Arabia. Through their backing of research and development and innovation (RDI), RDIA harbors the power to spur economic advancement and foster novel industries, all while countering key societal issues like health, energy, and food security. Its commitment to enhancing human capital and constructing supportive infrastructure aims to create an expert workforce and equip the necessary assets for ground-breaking research. Investments in R&D can instigate revolutionizing breakthroughs that could alter industries and benefit society immensely.

RDIA's funding schemes emphasize encouraging intellectual property growth, technology transfer, and commercialization, hence catalyzing an innovation-driven economy in Saudi Arabia. By advocating for entrepreneurship and innovative thinking, RDIA aids in securing Saudi Arabia's place as a global frontrunner in innovation, helping advance scientific understanding and technological progression worldwide. Our steadfast dedication to RDI is in harmony with the national ambition to forge a feasible future, attain the targets set in Vision 2030, and specify Saudi Arabia as an influential force in scientific innovation and technological progression. This strategy will chart the course for the country to become a pivotal center for cutting-edge research and development. RDIA leads the way in converting Saudi Arabia into an economy centered around innovation by endorsing RDI activities and nurturing progressive thinking.

Reactivating & Rebuilding of Existing Labs Initiative for Project-level Funding

About the Initiative

The kingdom of Saudi Arabia has more than 124 research centers and 180 research chairs scattered between universities, hospitals, ministries, and non-profit organizations. For the past decade, these centers were serving and contributing to the overall research and development activities within the kingdom. However, with the lack of a sustainable funding and support a considerable number of centers has reduced their capacity in term of research staff, or decreased their research outputs, or even temporarily stopped their research activities. In addition, many number of these research centers do not have a proper fabrication or prototyping facilities. The Research, Development, and Innovation Authority (RDIA) is lunching several initiatives to support the entire research, development, and innovation (RDI) ecosystem. RDIA has designed an initiative to fund existing labs to rebuild and increase their system capacity, to address the challenge of limited availability of fabrication and prototyping facilities, and to support their operational needs.

The reactivating and rebuilding of existing labs initiative in general is designed to support the overall research activity in the Kingdome and tailored to achieve the broader goal of creating economic, societal, and environmental impact. The initiative aims to foster scientific excellence and promote innovation, ultimately leading to significant breakthroughs and advancements across the four areas of national research and innovation priorities. The fund provided through the initiative targets the enhancement of the existing labs which will lead to increasing the number and quality of research outputs in terms of publication, patents, or ready for commercialization IPs. It will also expand the pool of national talented researchers and stimulate their participation in areas that will lead to breakthroughs in targeted fields. And enable them to pursue their scientific activities and ideas at all stages of the Technology Readiness Level (TRL1-TRL9).

The initiative is dedicated to support and invest in the kingdom's research centers and labs to maximize their impact to the economy and to ensure the competitiveness in the local and global RDI ecosystem. Through this initiative, research centers in the kingdom can take the opportunities to benefit from the provided support to acquire one or serval piece of equipment/instrument that support their research activities or goals, help them to train researchers, and be a part of the current advancement in research technologies. Also, labs and centers can benefit from this opportunity to perform maintenance or upgrading existing equipment which will advance their competitiveness. In addition, the initiative will allow them to hire research staff such as postdoctoral fellows and researchers to support the research activity in the center. And hire supporting staff such as technicians, specialists, or engineers to support researchers in the center. In summary the initiative will:

- **Fund** research facilities in various research fields in alignment with the national priorities;
- **Support** the competitiveness of the research activities of the kingdom at the local and national level;
- **Provide** the required fund to maintain or upgrade the status of the research labs or research centers in Saudi institutions;
- **Develop** scientific skills of Saudi researchers\scholars on utilizing cutting edge scientific technology;
- **Enable** research facilities in the kingdom to contribute to the advancement of knowledge and to the scientific community;
- **Assist** the facility with the required human capital, tools, and technologies;
- **Equip** KSA's research community with state-of-the-art facilities, elevating research quality and fostering innovation in pivotal areas;
- **Position** Saudi research establishments as prime hubs for attracting top-tier global scientific and engineering talent;
- **Stimulate** industry-research collaborations by providing industries access to specialized infrastructure;
- **Maximize** the efficiency of research facilities and ensure their long-term viability through comprehensive management and service providing;

Table (1): Summary of the track's input and the expected outcomes (refer to Appendix II for more details).

Tracks	Initiative Objective	Expected Outcomes for researchers/institutions
Reactivating & Rebuilding of Existing Labs Initiative	• Aim: Support and invest in the kingdom's research centers and labs to maximize their impact to the economy and to ensure the	• # Q 1Publications • # of Equipment • Upgrade report

	competitiveness in the local and global RDI ecosystem. • Input: All research labs and centers based in the Kingdom of Saudi Arabia are eligible to apply. They can be from academic institutions, public research agencies, hospitals, and researchers.	• Research Personnel Development • # of collaboration and partnerships • Licensed patents

Initiative's General Strategic Objectives

The strategic objectives of the "Reactivation and Rebuilding of Existing Labs" initiative by the Research, Development, and Innovation Authority (RDIA) are as follows:

- **State-of-the-art Laboratory Equipment:** to ensure that research facilities within the kingdom remain competitive and cutting edge, the initiative aims to identify and procure advanced laboratory equipment that aligns with the latest scientific and technological advancements.
- **Facility Enhancement:** undergo necessary maintenance to existing research labs and to upgrade these facilities. The goal is to modernize and revamp existing labs and transform them into world-class research spaces conducive to innovation.
- **Capacity Building:** attracting, hiring, and training highly skilled researchers and research students. A vital objective is to expand and enhance the research capabilities and capacities within Saudi Arabia, which would equip the country to lead future innovation and development activities.
- **Competitive Positioning:** aims to strengthen the positioning of the kingdom's research facilities at both local and global levels within the Research, Development, and Innovation (RDI) ecosystem. This involves investing in infrastructure, human resources, and processes.
- **Driving Force for Knowledge-based Economy:** through these strategic measures, the initiative aims to create a driving force that will propel the kingdom into their ambitious journey towards becoming an innovation-based economy and a beacon of scientific discoverability.

Initiative's RDI Focus Areas

The Initiative aims to promote cutting edge scientific research spanning the four national aspirations and priorities for RDI and their goals (refer to Appendix I for potential research topics):

1) Health & Wellness
    - Solve KSA's prevalent medical and behavioral health challenges
    - Achieve early prevention of diseases through personalized wellness and healthcare services
    - Disrupt digital healthcare to ensure health equity across the Kingdom
    - Supply the world with cutting-edge pharmaceutical and medical technology, biotech-based solutions and practices
2) Sustainability and Essential Needs
    - Sustainably secure supply of water, food* and power to the population and industry
    - Become a global exporter of advanced water & food techs (e.g., water desalination)
    - Establish KSA as a global paradigm on environmental conservation
    - Position the Kingdom as a regional supplier of sustainable and low-cost electricity

- Minimize the local emissions through adopting CCE framework
- Increase KSA's sustainability footprint

3) Energy and Industrials
    - Maintain & extend KSA's global leadership position in energy supply
    - Emerge as a leading nation in supply of alternative energy
    - Establish KSA as a regional hub for specialty chemical derivatives
    - Ensure hydrocarbon demand sustainability through advanced non-metallic products, blue hydrogen & COTC
    - Transform KSA's industrial sector towards high-value on-demand manufacturing
    - Establish competitive and sustainable mining as the third industrial pillar
4) Economies of the Future
    - Reimagine the future of urban living through zero-carbon, zero-car and hyper-connected cognitive cities
    - Become a global space champion, creating economic value from RDI spillover effects and galvanizing the nation around futuristic ambitious goals
    - Unlock unexplored deep sea for scientific and entrepreneurial usage
    - Foster digital technology frontiers in priority sectors to build a regional/global edge

Initiative's Core Activities

The main purpose of this initiative is to enables KSA's researchers to pursue their research activities at all stages of TRL. The research labs or research centers with a successful proposal should demonstrate these activities:

- Reactivating and enhancing existing research centers that have reduced their output or even paused operations due to issues like insufficient funding.
- Increasing the system capacity of these laboratories and research centers to improve their performance and increase their outputs.
- Addressing the challenge of limited availability of fabrication and prototyping facilities by funding the development of such infrastructure.
- Purchasing new equipment to advance the capabilities of the research centers.
- Maintaining and upgrading existing facilities to ensure they continue to serve the needed research purposes effectively.
- Boosting the quality and quantity of research outputs such as publications, patents, or IPs ready for commercialization.
- Attracting, retaining, and expanding the pool of national talented researchers, thereby invigorating the domestic research and innovation ecosystem.
- Providing support for researchers to pursue their scientific activities and ideas at all stages of the Technology Readiness Level (TRL1-TRL9).
- Stimulating researcher participation in areas that align with the national research and innovation priorities.
- Increasing the competitive level of the Kingdom's research facilities locally and globally.

Submission and Timeline

The general guideline is to formulate proposals keeping short to medium-term targets. As such, initiative urges applicants to create proposals that can be implemented within a timeframe of 3 years from the date they receive the award. Budget

requested by applicants must be fully justifiable. The following timeline will be strictly followed for this round (refer to Appendix III for additional details on the reviewing process).

Table (2): Timeline.

Grant Announcement	30-Aug-2023
Deadline to Submit the Proposal	30-Sep-2023
To submit your application, please visit the link: https://rdia.gov.sa/grants	

Important steps:

- Read all the relevant documents (i.e. Guidelines, Call for proposal, Proposal template).
- Use the submission portal "National Portal for Research Grants".
- Prepare and upload all required documents.

General Procedures for Submitting the Grant Proposal

Applicants

Individual researchers:

1. The applicants must ensure that their proposal is submitted during the specified times.
2. The applicant must ensure that their proposal is according to RDIA's policies and guidelines, and should carefully read all the program's documents before the proposal preparation.
3. All applicants required to submit their proposals through the portal and upload a separate document in a PDF or Word format file in the portal according to the proposal template descriptions.

Research institutions:

1. The research facilities (i.e. research lab/center) must ensure that their proposal is submitted during the specified times.
2. All research lab/center should carefully read all the program's documents before the proposal preparation.
3. Applicant (i.e. research lab/center) must ensure that their proposal is according to RDIA's policies and guidelines.
4. All applicants required to submit their proposals through the portal and upload a separate document in a PDF or Word format file in the portal according to the proposal template descriptions.

Science and Technology Unit (STU)

1. STU in each institution will receive all proposals and review them for compliance to RDIA's guidelines and policies.
2. Check all documents for research integrity and ethics.
3. Support applicant in preparation, submitting their proposals, and receiving the fund.
4. Monitor progress against the provided timeline.
5. Receive and review all required project's reports and submitting them to RDIA.
6. Overall manage the grants cycle and any request from RDIA.

RDIA

1. RDIA will review and verify the proposals.
2. RDIA will carefully examine the proposal to confirm that they meet all submission requirements.
3. Once this review is complete, RDIA will provide recommendations for each proposal.

4. RDIA will verify that the proposals adhere to the submission guidelines and standards prior to submission for evaluation.
5. RDIA will notify the STU of the proposals that have been submitted for evaluation and those that have not been sent due to non-compliance with the submission guidelines and standards.
6. The scientific evaluation results for the proposals will be presented to RDIA for approval.
7. RDIA will issue funding decisions for the projects.
8. RDIA will only sign a project implementation contract with the research lab/center director or equivalent through the STU after the necessary funds for the project have been secured.

Eligibility and Governance

Eligibility for Funding

The initiative in place will support proposals in a project-based funding to reactivate and rebuild existing labs within the kingdom, with the focus on labs specializing on area related to the four national aspirations and priorities for RDI sector. In general, successful applicants as individual researcher or research lab/center should have the following criteria:

Eligible Individual researchers:

- The main applicant should be an independent researcher with a PhD or its equivalent for a minimum of 5 years at the time of proposal submission. For eligibility in RDIA's initiative for reactivating and rebuilding existing labs, the qualification should have been obtained in 2018 or earlier, based on the calendar year.
- The applicant should currently possess, or have previously received, a notable peer-reviewed research grant. This is usually a long-term grant or fellowship (lasting at least 3 years) that covers research expenses and might also fund the salaries or stipends for the applicant and their team members.
- The researcher should demonstrate extensive knowledge in their specific field of research.
- The researcher should be based in the kingdom.

Eligible research labs/centers:

- The research lab/center should be based in the kingdom.
- The research lab/center activity should demonstrate extensive knowledge in their specific field of research.
- Strong research track record and uphold high standards in their research work, consistently ensuring that their research outputs are of superior quality, relevance, and impact.
- The lab/center management should be far-sighted and proactive, able to anticipate future trends and advancements in their field.
- Robust collaborative networks and the skills necessary to work seamlessly with others in a research ecosystem.
- The facility leadership must demonstrate ability to lead and inspire a team, promoting a conducive and engaging research environment.
- Fully align themselves with RDIA's strategy and objectives, showing commitment to enhancing the Research, Development, and Innovation ecosystem of Saudi Arabia.

Eligible Projects:

- Projects intending to perform groundbreaking research and development in line with national priorities. The chosen center/lab should contribute to the kingdom's RDI environment in a significant way, enhancing its competitive edge both locally and internationally.

- Projects aimed at the revitalization and overhaul of existing research labs. These could include upgrades to current facilities or the procurement of cutting-edge research equipment or instruments. The initiative also supports the maintenance or enhancement of pre-existing equipment.
- Proposals for capacity-building activities that improve the skills and knowledge of researchers. Projects that plan to hire research staff like postdoctoral fellows, scientists, technicians, specialists, or engineers- basically, any personnel critical towards the effective conduction of research activities- would also be considered.

Research Ethics

It is required that the project supported is designed and conducted in such a way that it meets specific ethics principles, and is subject to proper professional and institutional oversight in terms of governance. Please refer to principles below:

- The project should aim to maximize benefit for individuals and minimize risk and harm.
- The rights and dignity of individuals and groups should be respected.
- Wherever possible, participation should be voluntary and appropriately informed.
- The project should be conducted with integrity and transparency.
- Lines of responsibility and accountability should be clearly defined.
- Independence of the project should be maintained and where conflicts of interest cannot be avoided, they should be made explicit.
- Take all the necessary ethical approvals and permissions before the start of the project.

RDIA will:

- Only fund project which has an adequate and appropriate ethics statement, and which takes the ethics dimensions of the research seriously.
- Consider reviewer or panel member disagreement with the suggested project approach to ethics as either grounds for a conditional grant or rejection of a proposal (where it calls into question the team competence or the feasibility or validity of a proposal).
- Consider suspension of payments and grant termination if the review shows that a project requires major changes which will alter it so much that it can no longer retain RDIA support.
- Only fund organizations that have processes in place to follow the guidance in this framework and comply with the grant conditions and the RDIA Policy and Guidelines.
- Hold accountable the research lab/center director or equivalent involved in any allegations of research misconduct and breach of compliance with the grant conditions. This could result in the immediate suspension of the individual project and other projects.

RDIA's Expectation of Successful Applicants:

The Research, Development, and Innovation Authority (RDIA) has outlined the following expectations from successful applicants under this initiative:

- Project Alignment: Successful applicants should clearly demonstrate how their projects align with the kingdom's priorities and contribute to strengthening the kingdom's RDI environment.
- Effective Utilization of Funds: The RDIA expects applicants to efficiently utilize the grant for the intended purpose, be it procuring new research equipment, improving existing facilities, or hiring necessary personnel.

- Evidence of Innovation: Projects must embody innovation, pushing boundaries in their respective fields, and contributing to advancements in scientific knowledge.
- Competitive Enhancement: Successful applicants should use the funding to increase the competitiveness of their research center both locally and globally, contributing to the overall RDI ecosystem in the kingdom.
- Human Resource Development: The initiative also expects successful applicants to focus on capacity building. This includes hiring and training staff such as postdoctoral researchers, technicians, engineers, and support staff who contribute to effective research execution.
- Beneficial Outcomes: RDIA anticipates that the results of funded projects will yield significant and tangible benefits to the scientific community, both within the kingdom and at a global level.
- Reporting and Accountability: Successful applicants will be expected to regularly report progress and outcomes, demonstrating transparency, accountability, and integrity in the use of the grants.

Overall, emphasis should be laid on how successfully the applicants can leverage the funding to improve their research capabilities and contributions to the scientific community.

Communication and Acknowledgment Policy:

Effective communication and acknowledgement policy is an integral part of maximizing the impact of quality of the initiatives' outcomes. RDIA communication policy aims to enhance the communication of RDIA-funded projects to potential users and beneficiaries of the research. Compliance to the policy is a condition of the receipt of funds from an RDIA research grant. The communication policy includes the following obligations:

- Giving initial publicity for the grant, together with the host research organization(s).
- Acknowledging RDIA support as far as possible, including all external communication, such as press releases, PowerPoint presentations, papers, stationery etc.
- Giving the RDIA advance notice and sight of press releases at least two working days before they are distributed and, where possible, advance notice of likely newspaper articles or media appearances.
- Communicating the research findings through publications, seminars, conferences, electronic outlets and the media, to both academic and non-academic audiences, potential users and beneficiaries (especially business, government, voluntary organizations, community groups and the public).
- Submitting details of outcomes from the grant and for up to three years after the end of the grant period.
- Successful applicant should extend their appreciation to the RDIA in all scientific outputs of the project through stating (For example: **The authors acknowledge that the funding obtained from the Research, Development, and Innovation Authority (RDIA), Saudi Arabia, Riyadh, Reactivating & Rebuilding of Existing Labs Initiative, number XXXX, supporting the generation of these data and publication**).

Prior permission must be sought before the RDIA's name can be used in connection with the title of any unit, center, department, etc. which the RDIA is supporting either wholly or in part. The words 'RDIA project' may not be used as a heading in correspondence, reports or questionnaires.

Use of Funds

While the below expense categories are used to provide applicants with high-level guidance, the initiative does not set limits or stringent criteria on how the funding can efficiently be utilized to achieve the intended goals. Rather the initiative offers the applicants reasonable degrees of freedom in raising high quality proposals with a cap limit on expenses.

Permissible expenses:

For RDIA's reactivating and rebuilding existing labs initiatives applications, the approved expenses include:

- New equipment costs, factoring in VAT, shipping, and installation (if needed).
- Cost-effective equipment upgrades.
- Service or maintenance agreements (up to 2 years post-purchase).
- Supplies essential for equipment setup or use for up to 2 years post-purchase (excluding specific research projects).
- Installation expenses for large-scale equipment.
- Software-related expenses.
- Training for primary users of the equipment.
- Salaries for new researcher, postdocs, and specialists.

Non-permissible expenses:

For RDIA's reactivating and rebuilding existing labs initiatives applications, the following expenses are not approved:

- Indirect costs or overheads.
- Organizational overhead-related expenses.
- Costs related to building, construction, or renovation.
- Equipment value reduction over time.
- Unforeseen or general costs.
- Expenses for executing research projects.
- Fees for accessing the proposed infrastructure.
- Entertainment and guest expenses.
- Basic office necessities and tools.
- Patent or technology transfer expenses.
- Costs for organizing conferences or workshops.
- Supplies, software, or maintenance fees funded elsewhere (to prevent redundancy in funding).

Important Documents

The following documentation will be required throughout the initiative:

Pre-allocation:

1. Comprehensive proposal, see the initiative's proposal template document.

2. The research lab/center director or equivalent Curriculum Vitae.
3. If an individual researcher is applying approval from the research center/lab director or equivalent is required (if applicable).

Post-allocation:

1. Expenditure Statement (Annual).
2. Interim Report (Semi-annual and Annual).
3. Final Report.

Table (3): Summary of the important documents.

Document	Requirements
Comprehensive Proposal (Please see the Proposal template document)	Comprehensive Proposal should contain the full details of the following information*. • Overview of the proposal's objectives. • Summary of the impact it will have on the Research, Development, and Innovation (RDI) ecosystem. • Current state of research labs. • Why the labs need to be reactivated and rebuilt. • Evidence to support the need for the initiative. • How it will improve the RDI ecosystem in Saudi Arabia. • Equipment needs. • Existing facility maintenance/upgrades. • Recruitment and training plans for researchers and research students. • Strategies to ensure competitiveness at both the local and global level of the RDI ecosystem. • Detailed projected expenses accounting for all parts of the initiative including equipment purchasing, facility upgrades, and staffing. • Proposed timeline for the initiatives including initiation, major milestones, and expected completion time. • Strategy for making the renovated and upgraded labs sustainable. • Long term perspective for labs' utilization.
Interim Report	Provide an update on ongoing outputs, impacts, and outcomes as the Grant cycle progresses.
Final Report	Provide a final statement on outputs, impacts and outcomes at the conclusion of the grant cycle.

Evaluation

Submitted proposals will be evaluated based on the following criteria (refer to the proposal templet for addition information):

- **Relevance**: Relevance to the targeted area of RDI sector and Vision 2030;
- **Potential Impact**: Potential benefits to academia, industry and the R&D ecosystem of KSA in its entirety;

- **Technical Merit**: Scientific and intellectual rigor, potential to create new and important knowledge, and appropriateness of the research design;
- **Quality of Research Team**: Capabilities and track record of the proposed research team;
- **Quality and clarity:** The research/project plan with associated milestones.
- **Project Objectiveness:** Must clearly articulate how they will contribute towards achieving the strategic objectives of the initiative.
- **Detailed Proposal:** Each proposal should contain a comprehensive plan, including a detailed summary of the research plan, the required lab technology and/or facility upgrades, capacity-building activities, and a timeline for implementation.
- **Budget Estimation:** A clear budget outline is vital, including an estimation of funds required for equipment, maintenance, human resources, and other related expenses. Please note, the budget should align with the proposed activities.
- **Impact Measurement:** Proposals should also clearly define how they will measure the project's success, including specific KPIs tied directly to the strategic objectives. This may include innovation indicators, publications, patents, the number of trained personnel, etc.

The Initiative's Key Performance Indicators:

- **Scientific Equipment Acquisition:** the number of state-of-the-art laboratory equipment procured and installed in the research lab.
- **Facility Upgrade:** infrastructure improvements and technology implementation.
- **Research Personnel Development:** the number of skilled researchers and research students attracted, hired, and trained.
- **Research Output:** the quantity and quality of research outputs, patents filed.
- **Number of partnerships, scientific collaborations, attracted funds** (i.e. public sector, private sector, non-profit organization, universities).

Appendix I: National Priorities Topics

Health and Wellness

Prevention, surveillance, monitoring, and disease Management	• Diabetes. • Obesity. • Infectious disease. • Congenital Heart Disease.
Screening and diagnostics	• Rapid molecular identification of pathogens. • Early detection and diagnosis of cancer. • Genome and epigenome of rare diseases. • Sleep disorder. • Mental Health.
New biotech drugs development	• RNA therapies. • Vaccine development. • Immunotherapies. • Stem cell therapies. • Ageing. • Microbiome therapeutics. • Antimicrobial Resistance Research. • CRISPR and base-editing technologies.
Emerging rejuvenation technologies	• 3D bioprinting. • Bioartificial organs. • Synthetic biology. • Digital therapeutics. • Single cell analysis. • Telemedicine and Virtual Healthcare Services. • Wearable Medical Devices.

Sustainable Environment & Affordable Supply of Essential Needs

Innovative water research	• Enhancements, Optimization, & efficiency of Desalinations systems and technologies. • Membranes Technology. • Direct geothermal desalination. • Novel storage to minimize reserve water stagnancy. • Wastewater effluent reuse in industry, agriculture, and treatment. • Innovative methods to reduce water consumptions for different applications.

Biodiversity	• Protect existing forests and use natural forest regrowth. • Genetic modified seeds. • Smart irrigation, innovative fertilization methods. • Satellite imagery to detect wildfires, and emergency messaging devices/systems. • Carbon absorption sensors and mitigation of air pollution. • Habitats monitoring. • Illegal drug, farming, and logging detection. • Flash flood and environmental disasters protection.
Net-zero emissions	• Autonomous vehicles and fuel Cell Electric Vehicles. • H2-Internal Combustion Engines Vehicles. • Renewable energy generation, and Waste/Biomass energy generation. • Nuclear energy generation (fission based). • Oxyfuel combustion energy generation, and Chemical looping Tech. • Hydrogen combustion, clean hydrogen, and new hydrogen carriers. • Use of captured carbon for post-treatment of water instead of carbonates. • Allam Cycle (Supercritical CO2) and CO2 as refrigerant.
Food sustainability	• Feed Inventory Management and livestock Farm Intelligence. • Milk Preservation and production Optimization. • Livestock hygiene and waste management. • Implementation of innovative fertilization methods. • Soil health, fertility, irrigation, nutrients, soil microbiome. • Traceability and Food Safety. • Food Innovative Ingredients and Sustainable feeds. • Regenerative and Sustainable farming. • Waste food recycling program. • Circular Economy. • Agritech.
Cooling technologies	• Sustainable refrigerant in vapor compression systems. • Elastic nickel-titanium wires. • Organic solid crystals to replace refrigerants. • Advanced evaporative cooling technology. • Smart thermostats for energy management systems. • Smart material that absorbs moisture. • Microturbines powered by solar energy. • Green roofs to further increase the vegetation coverage in the city and green belts around major cities and areas. • Reflective paints and coatings. • Adiabatic cooling transfers.

Energy & Industrial Leadership

Conversion of crude oil to chemicals	• Crude oil pretreatment system advancement. • Development of new catalysis to increase product yield, reduce CO2 emissions and minimize waste. • New reactor design, simulation tools and testing/demo units. • New generation crackers able to withstand heavy crude coking, reducing maintenance costs. • Nuclear power plant to supply utility steam and electricity to nearby petrochemical facilities. • Develop efficient processes for crude oil to hydrogen. • AI-based real-time demand sensing models to leverage market forecasts and shift application portfolio to reduce variable costs. • AI and drone program for crude oil, gas, and petrochemical pipelines monitoring.
Clean hydrogen	• Alkaline electrolyser, Proton exchange electrolyze, Anion exchange electrolyze. • Solid oxide high temp. cell. • Co-electrolysis systems. • Methane pyrolysis. • Photocatalytic water splitting. • Steam and autothermal methane reforming. • Plasma production of turquoise hydrogen. • Reduced reliance on precious metals like iridium & platinum. • Transition to cobalt free alkaline units. • Liquid organic H2 carriers. • Liquefaction for transport & storage. • Pressured containers for stable storage. • Salt cavern containers for storage. • Hydrogen/Ammonia Safety technologies. • FCEVs–Fuel cell electric vehicles. • H2-Internal Combustion Engines (H2ICE) vehicles. • H2 based Carbon neutral chemical. • Transportation of hydrogen.
Innovation EV batteries	• Smart energy management systems. • Novel battery chemistries for displacing scarce materials. • Pressure mapping insights for better design and quality batteries. • 'Million-Mile' electric-car battery with lithium-iron-phosphate batteries. • All-Solid Battery replacing the liquid electrolyte in batteries. • Smart Compression and Compilation. • Alternative materials to reduce the cost of battery. • Dense network of normal-power EV charging points. • EV Charging Management. • Vehicle to Grid (V2G) enabling charged power to be pushed back to the grid. • Flexible voltage and power flow control devices.

Industrial robots	• Smart robotic arms & autonomous mobile robots for flexible material handling. • Silicone, polyurethane, and PVC cable & wires for enhanced assembly line systems and data transmission. • High-performance torque sensor to achieve back-drivability. • Smart sorting and picking system assisted with geo analytics and AR based visualization. • Geospatial multisensory system design & integration. • Reinforcement learning for automation. • Anti-collision sensors. • 3D embedded vision to provide depth, angle, and contour data for complex tasks. • Convolutional neural network for object detection and characterization in real-time operation. • Natural language programming to enable communication between humans and machines. • Speech and image recognition.
Nuclear energy	• Small Modular Reactor (SMR) nuclear fission power plant. • Innovative I&C for diagnostics. • Reactor test beds to demonstrate different conceptual designs. • Cooling systems chemistry controls improvements. • Advanced composites/alloys for novel reactor concepts. • Liquid metal corrosion reduction. • Advanced techniques and solutions for joining, welding, machining, and forming. • Robotics for nuclear waste disposal and nuclear material accounting. • Developing new fuels for extended refueling cycles. • Develop intrinsic proliferation resistant fuels. • Radioactive waste volume reduction through transmutation technologies. • Advanced nuclear fuel cycles to enhance fuel performance. • Advanced fuel and material irradiation and testing facility. • Integral Thermal hydraulic test loops.
Renewable energy	• Smart Grid networks and applications and Increased efficiency. • Advanced Protection Distribution Grids with High Penetrations of RES. • PV distributed generation in KSA. • Battery mgmt. & modelling. • Ultracapacitors, Cells. • Novel energy storage materials or cycles for high volumetric. • Energy density storage systems. • P2P trading and decentralized energy exchange platforms. • Hybrid Energy Generation Systems. • Geothermal efficiency, and production improvement. • Power System Planning and Operation with High Penetrations of renewable energy. • Novel concepts for using solar thermal sources & technologies. • New PV module architectures, module components, and innovative cell.

	• Fundamental understanding of degradation mechanisms in PV. • Cost-effective methods to recycle PV modules and components.
Autonomous technology	• Unmanned Aerial Drones surveys to identify potential mining sites. • Geo-analytics and Hyperspectral imaging. • Lidar technology to examine open mine surface for faster mine model building. • AI based simulations System for mine safety management and hazard identification. • IoT systems for continuous software monitoring and control. • AR/VR Interface and digital twins to simulate scenarios. • Autonomous drill rigs/mining trucks/Haulage systems. • Autonomous operations (blasting, dozing, loading, fueling, etc.). • Object avoidance/detection systems. • Automated ore sorting and material handling systems. • Mine Tailings Management and precious. • Carbon capture and storage of mining operations reducing carbon emissions. • Carbonated tailings to capture carbon emissions in metal minerals permanently.
Raw materials and products in industry	• Recycled carbon. • Solar-powered and connected trash compactor. • Laser-Induced Breakdown Spectroscopy (LIBS). • Near-infra-red (NIR) sorting technology to sort plastics. • X-ray sorting technology for sorting. • Plasma gasification to change solid wastes into energy-filled products. • Bio-drying to remove moisture from a waste stream and reduce its overall weight. • Sustainability and traceability of materials using blockchain. • Pyrolysis to convert plastic waste into a fuel oil substitute. • Advanced Dry Recovery (ADR) technology. • Conversion of carboard to carbon fiber and biowaste to carbon fiber.

Economies of the Future

Space exploration	• Geospatial Intelligence/Earth Monitoring/Satellite Imagery. • Commercial Space Launch: Hardware & Service. • Building a vertical spaceport. • Space crafts & Components. • Space Refueling service. • Space-based solar power. • Laser communication. • Satellite communication. • Micro/nanosatellites. • Orbital logistics. • Microgravity materials.

	• In orbit and off earth manufacturing. • Reusable launch vehicles. • Environmental Control and Life Support System (ECLSS). • Commercial space stations. • Space Food & Proteins.
Smart cities	• Circular Economy / Waste to Products. • Climate Intelligence. • Urban environment monitoring. • Smart sustainable buildings. • Smart road networks. • Urban air mobility (UAM). • Crowd analytics for better crowd management. • Collective intelligence through smart infrastructure & advanced data fusion. • Low latency connectivity through 6G. • Metaverse XVRS. • General purpose humanoid robots. • IoT Air Quality and Noise Pollution Monitoring. • Gunshot Detection. • Smart disaster management. • Drones for risk management. • Crowd management.
Artificial intelligence	• Generative AI (GenAI). • Fast and Robust Self supervised learning for faster training times. • Human machine interface in order to be able to modify protocols at whichever depth and whichever speed required. • Personalization of virtual assistants for improved social and emotional engagement. • Dialect language detection and adaptation (especially for semantically complex languages such as Arabic and Mandarin). • Low data AI able to start in any environment with reduced pre acquired data. • Improved locomotion. • Spatial Artificial Intelligence, Semantic SLAM, Semantic Navigation. • Stronger and more flexible actuators for movement.
Quantum computer & Computing performance	• Quantum annealing machine. • Superconducting qubit. • Quantum entangled light sensor. • Optical lattice clock. • Distributed Quantum Sensing. • Topological quantum matters. • Spintronic materials. • Photonics material. • Condensed matter physics. • Cryogenic engineering. • Quantum error correction theory and interface technology.

	• Standardization of quantum computers.
Net-zero aviation	• Fully/Hybrid electric aircraft concepts. • e-SAF using electrolysis & by thermo-chemical conversion of organic matter. • Distinctive aircraft design to accommodate liquid hydrogen storage. • Waste heat utilization for aerodynamic performance. • Advanced Lightweight Aircraft Design. • Liquid hydrogen-fueled long endurance drone for cargo.
Automation of logistics	• Robot manipulators for easy and efficient picking, sorting, and packing/palletizing. • Fully automated generalized bin-picking systems in robots. • Collaborative robots (cobots) integrating human behavior prediction into planning. • Drone docking stations for pickup and delivery services. • 3D Printing enabling nearshoring of production. • Fully robotic ship offloading processes. • Radiofrequency identification (RFID) technology for logistics and inventory systems. • Smart wearable technology including glasses using Augmented Reality. • Deploying APIs (application programming interface) for greater supply intelligence. • Warehouse drones to check inventory. • Automated storage and retrieval systems. • Vehicle-to-Infrastructure (V2I) testing with smart traffic lights. • UAV Traffic Management (UTM) for delivery applications.
Robots to assist humans	• Lithium iron phosphate batteries that do not explode. • Silent pneumatic actuators, with optimized air compressors. • Laser sintering of titanium. • Legged locomotion “brute force” (control command approach) or intuitive biomimicry approach. • Smart Chairs: Personal mobility omni-directional robots. • Sensor Fusion to merge data from multiple sources. • Semantics understanding. • Real-time object detection models. • Machine learning. • Robot Decision Making System. • Humanoid embodiment for humans to relate. • Robot Aesthetics: Crossing the Uncanny Valley. • Facial expressions. • Information processing visual cues.
Future of connectivity	• Massive scale of IoT networks. • Digital twinning for simulations and decision making. • Software-defined networking. • Network function virtualization.

	• Fully decoupled radio access network (FD-RAN). • Spectral efficiency. • Connected intelligence. • Environmental sensing networks. • Ultra-Reliable and Low-Latency Communications. • Ambient backscatter communication. • Quantum communication. • Holoportation (high quality reconstructed 3D models of people) and holographic communication. • Reconfigurable intelligent surfaces. • Vehicular Cloud Computing. • Zero-trust architectures. • Homomorphic encryption.
Technologies for underwater exploration	• 3D printed parts able to sustain deep-sea pressure. • High yield steel alternatives (aluminum, titanium composites). • Acrylic sheets that offer double the impact resistance. • Ocean thermal energy by harnessing temperature differences between ocean surface waters and deep ocean waters. • Renewable energy supply generated by green hydrogen electrolysis. • Optical wireless communications (UOWCs). • 3D benthic mapping of the sea. • Underwater acoustic communication network. • Aquatic drones to explore high-pressure depths. • Smart sea robots.

Appendix II: Regulatory Guidelines for the Grants

These guidelines are designed to ensure the successful implementation of the initiative, fostering a thriving RDI environment in the kingdom.

General Regulatory Guidelines

- Eligibility: Grants are available to researcher or research institutions within the kingdom that show alignment with the goals of the initiative. Eligible applicants are expected to clearly demonstrate this alignment in their proposal.
- Grant Utilization: Grant funds must be used for reasons specified in the application, whether it's purchasing new equipment, refurbishing existing labs, hiring research staff, personnel training, or other aligned activities.
- Reporting: It is mandatory for successful applicants to provide regular project progress reports to the RDIA. These reports should include a detailed account of how the grant is used, updates on the research progress, findings, and any challenges experienced.
- Project Completion Timeframe: All projects that receive funding should be completed within the specified timeframe. Extensions may be considered on a case-by-case basis, provided the center completes a request and justifies reasons for the delay.
- Recruitment: If the grant includes funding for hiring of staff, all recruits should meet a specified qualification level. Recruits should also be engaged in tasks directly related to the project for which the grant was awarded.
- Equipment Purchase and Maintenance: If the grant is used to purchase new equipment or to maintain existing equipment, detailed records of these transactions must be kept. Equipment should be used solely for the purpose stipulated in the grant application, barring any exceptional circumstances.
- Compliance: The research centers must ensure compliance with all ethical standards and regulations relevant to the research being conducted. This includes obtaining necessary permissions, respecting copyright laws, maintaining data privacy.
- Audit: The RDIA reserves the right to conduct audits to ensure funds have been used appropriately and guidelines are adhered to. Non-compliance could result in penalties, including discontinuation of funding.
- Intellectual Property: Guidelines regarding ownership and rights to any intellectual property arising from the funded projects will be subject to the existing laws and regulations of the kingdom.
- Collaboration: If the project involves collaboration with other institutions, either domestically or internationally, a detailed agreement of the collaboration should be submitted.

Disbursement Authorities

The determination of disbursement authorities, check signing, proposal approval, contract signing, and vendor accreditation should align with the national laws and regulations.

Providing Equipment and Supplies

1. The equipment and supplies approved in the project budget should be provided in accordance with the guidelines applicable in the entity.
2. If the project requires equipment or supplies other than those proposed in the research project, the principal investigator of the project must follow the following procedures:
    - Submit a request to the STU for the required change, including justification and detailed information about the alternative equipment or supplies.
    - If the STU approves the change request, the guidelines for providing the equipment or supplies mentioned above should be followed, provided that the request does not result in a change in the approved budget for the overall project equipment category.

Transfer between Budget Items

The principal investigator is permitted to modify or transfer certain approved budget items of the project as per RDIA's guidelines and regulations, provided that the following conditions are met:

- Budget adjustments may be made only twice during the project period, in accordance with the guidelines mentioned above.
- The STU is responsible for transferring funds between the approved budget items of the project, which must inform the RDIA of any decisions made and the reasons behind them.
- Approval of the STU for the request must be obtained.

Section Two: Management and Monitoring of Research Projects and Other Guidelines

Research Team Obligations

1. The researcher or research lab/center is required to comply with the regulations, policies, and guidelines approved by RDIA, including scientific integrity guidelines, intellectual property policy, ethics guidelines for research on living creatures, and any other policies or guidelines adopted by RDIA.
2. The researcher or research lab/center team must take full responsibility for any violation of these guidelines.

Procedures for Submitting Technical Reports

1. The research lab/center director or equivalent is obligated to submit periodic technical and financial reports on the progress of the project according to the following:
    - The technical reports should be submitted to the STU.
    - The technical and financial report to the STU every six months, outlining the technical progress of the project as well as its financial status.
    - An annual technical report for the previous year and a final technical report upon completion of the project's execution period.

- If the project duration is a year or less, only required to submit final technical and financial reports.
- Submit final technical and financial reports to the STU at the end of the project, including any extension period, in accordance with RDIA's requirements.
- The STU will evaluate the annual and final technical reports of the research projects through a neutral scientific body.

2. The research lab/center director or equivalent is required to make modifications according to the recommendations and comments provided by RDIA regarding the annual technical report and take them into consideration when preparing the next technical report.
3. The cost of evaluating rejected technical reports will be deducted from the project budget.
4. The research lab/center director or equivalent of the project funded is authorized to delegate some of their tasks to the project manager.
5. If the final report is not submitted within the designated timeframe, the STU may withhold some or all the research team's allowances, in coordination with RDIA.
6. If the technical report is rejected more than twice, the project will be classified as a stalled project, and RDIA, in coordination with the STU, has the authority to either continue or cancel the project. The research lab/center director or equivalent is responsible for all repercussions of this decision, including the repayment of any allowances paid.

Postponement of Report Submission

The research lab/center director or equivalent is permitted to request a postponement of the submission deadline for technical or financial reports, subject to the following regulations:

- The request for postponement must be supported by compelling justifications.
- The request for postponement must be submitted at least 30 days before the report's due date.
- The request for extension of the annual or final report submission cannot exceed a period of 60 days.

Research Outputs

The research lab/center director or equivalent is obligated to submit the minimum required project outputs as specified for the program. A weighted points system is used to evaluate the performance of projects under this initiative, with a priority on quality over quantity.

- As Shown in Table 5.AII., the minimum points required for the reactivating and rebuilding of existing labs initiative is (80) points.

Table (1.AII): Weighted-Points System for reactivating and rebuilding of existing labs initiative.

#	Project Output*	Weighted Points

1	Number of publications resulted from reactivating the research lab/center	5/paper
2	Number of advanced equipment purchased to improve the overall all labs' capabilities	30
3	Detailed report on the number of existing equipment that has been upgraded or serviced	25
4	Granted patent resulted from reactivating the research lab/center	20
5	Patent filing as a resulted from reactivating the research lab/center	10
6	Number of researchers hired (postgrads student, postdoc, professor)	10/researcher
7	Number of research supporting staff hired (technicians, engineers, specialists)	10/supporting staff
8	Capability development conducted on existing staff (training programs, and career development courses)	5/course or training

Tracking these outputs is a crucial step in assessing the success of the project and ensuring that it is meeting its intended objectives. This evaluation helps to determine the effectiveness of the project and whether it has achieved its goals. The evaluation process of the project's outputs for the initiative shall be conducted by the STU and shall notify RDIA, and it should be conducted in accordance with the guidelines and regulations established by RDIA.

Liability Waiver and Project Closure

1. Upon submission and acceptance by RDIA of the following documents, the responsibilities, and obligations of the team for the project come to an end:
   - Accepted final technical report.
   - Approved final financial report.
   - A copy of all scientific outputs from the project.
2. All the aforementioned documents must be submitted within one month of the Unit's notification of the acceptance of the final technical report.
3. Upon receiving the aforementioned documents, RDIA will issue a notice to the entity to close the project within one month at the most. If no notice is received from RDIA, the project will be deemed closed.

In the Absence of a Specific Provision

In case these rules do not contain a specific provision, then the regulations approved by RDIA or any applicable entity regulations, as well as any decisions issued by RDIA, shall be followed.

The Right to Interpret or Amend the Rules

The exclusive right to interpret or modify any provisions of these rules lies with RDIA. The decisions and supplementary regulations concerning the regulation of research grants that RDIA issues are an essential part of these rules.

Implementation of the Rules

1. These rules shall apply to all grants projects as of their approval date, and this guide replaces the previous rules and instructions, and all conflicting provisions or exceptions shall be annulled.

2. These rules are subject to revision every five years from the date of issuance or as needed.

Appendix III: Application and Proposal Selection Process

Application Process

The initiative solicits applications in a predesigned format to facilitate comparable, consistent and expedited review. The portal is available to applicants through the RDIA website (https://rdia.gov.sa/grants) after applicant's registration and account activation. Applicant must read and understand guidelines for each section of the application form before completing the full application. No other means of submission is acceptable. All application must be submitted no later than the deadline stipulated in the call for proposals.

Review Process

The initiative adheres to global best practice in initiative management to ensure utmost degrees of objectivity and quality. A qualified Scientific Review Committee appointed by the Oversight Committee will monitor, guide and facilitate the initiative's review process. Throughout this process, the initiative's personnel and selected external reviewers will adhere to all conflict-of-interest and confidentiality requirements.

In keeping with best practices, the initiative has adopted two phases process each phase with its own application review steps:

- First phase, an initial review of every application will be conducted upon receipt of the grant application forms to ensure that the proposal meets all requirements specified in the call for proposals. The Science and Technology Unit (STU) in the institutions will ensure the completeness of the applications per the guidelines and policies and check for plagiarism. Later the STU will send the documents to the Initiative Secretariat. The initiative's Secretariat will interact with STUs and the applicants as needed to solicit any missing information.
- Second phase, complete grant applications that meet initiative priorities and budget constraints are, subsequently, evaluated in terms of technical merits. This step is conducted by at least three independent reviewers or a panel committee. Scientific Review Committee of the initiative will select reviewers to each application based on relevant expertise and/or experience. Following the receipt of reviewer's feedback, a summary statement report for each application is prepared which include reviewers' written critiques, recommendations and an average final score. The summary statement is forwarded to the Oversight Committee and funding recommendation of highly scored applications will be approved. A notice of approval or rejection will be sent to STUs or the applicant once the review process is complete.

Award Process

Upon receiving the notice of award, the procedure for commencing the approved project is set into motion. The Initiative Secretariat will communicate with the researcher for necessary documentation and hand over the coordination to the STUs. Henceforth, the operational follow up with the granted proposals will be carried out by the STUs.

Initiative Monitoring and Evaluation

The initiative takes a balanced and systematic approach to monitor and evaluate the initiative. The Initiative Secretariat, in consultation with the STUs, sets forth periodic reviews to ensure all funded project are progressing toward timely completion with results. Technical and financial reports are expected to be submitted in consistent format. The winning proposals will be provided with the data collection forms and report templates and guidelines upon grant award.

Reports

Four key reports for project monitoring and evaluation will be requested:

1. Semi-annual Reports: to enable oversight across the initiative, semi-annual report will be conducted by the STUs using simple forms and report templates approved by RDIA.
2. Annual Reports: for projects spanning more than a year, an annual report will be submitted by the beneficiary to STUs for evaluation. In this report, comprising technical, management and financial sections, the beneficiaries are expected to show activities completed, ongoing activities, progress accomplished toward stated goals and any risks that may affect the project's progress.
3. Final Project Report: the beneficiary will submit a final report within 30 days of project completion to STUs. Similar to the Annual Report, the Final Report will comprise technical, management and financial sections, in addition the report should clearly articulate the results and deliverables. The STUs will prescreen the reports before being reviewed by external reviewers.
4. All RDIA's grant holders are required to report on outputs and impacts arising from their research program associated with this grant for the duration of their award and for up to five years after the award end (close) date.

Project Quality

Based on RDIA's Strategy, funding allocations will be performance-based. When applying for grants, it is important for researchers to be aware of the requirements for grant closure in order to ensure successful completion of the project and proper use of grant funds. These requirements may vary depending on the specific grant program, but typically include completion of all project activities, submission of all required reports, compliance with RDIA's policies and regulations, and preparation and submission of closeout documentation.

In a grant application, it is important for the applicant to include expected outcomes for the proposed project. These outcomes may include various forms of as indicated for each initiative. By including these expected outcomes in the grant application, the applicant is providing a clear indication of the potential impact and significance of the proposed research. This information is important for RDIA to evaluate the feasibility and potential success of the proposed research project to be funded. Additionally, by setting clear expectations for the outcomes of the research, the applicant can better track and document their progress throughout the project, which is critical for successful grant closure.

Appendix IV: Terminology and Definitions

The following terms and expressions have the meanings indicated unless the context requires otherwise:

Regulation: Executive Research Grants Regulation.

Authority/RDIA: Research, Development, and Innovation Authority.

Entity: Any entity, whether fully or partially involved in conducting any research, development and innovation activities and marketing their outputs, including but not limited to research chairs, from the public, private, or non-profit sectors.

Authorized Representative: The designated individual, duly authorized by the entity, with the power to sign the executive contracts for research grants provided by the Authority. The authorized representative is responsible for overseeing their implementation.

The Science and Technology Unit (STU): A specialized administrative unit established within the entity as an independent entity, directly linked to the authorized representative of the entity. It is responsible for managing, executing, and monitoring the administrative, technical, and financial tasks of the research grants for the entity and its affiliated entities, in accordance with the governing rules, regulations, and instructions issued by the Authority.

Initiative Programs: A collection of specialized programs aimed at supporting research grants based on national priorities.

Research/Research Project/Research Grant: It is a systematic work with a defined beginning and end, executed according to established scientific principles to obtain a scientific outcome. It is conducted by a specialized research team with specific resources, including human resources, financial resources, and necessary facilities for project implementation.

Research Proposal: A scientific and methodological description of the nature and significance of the research problem, objectives, qualified human resources, working methods, implementation timeline, necessary resources and their financial cost for executing the proposed research, expected results, and a mechanism explaining how to utilize the outcomes of the research project and the beneficiaries of such outcomes.

Grant Start Date: The date on which the implementation of the research grant begins, according to the approved work plan, which includes scheduling for the submission of required technical and financial reports.

Budget: A document approved by the funding entity that includes details of the financial support required for the implementation of the research grant, in accordance with the approved work plan.

Grant Duration: The time period approved by the funding entity for the execution of the research grant.

Human Resources: All the accredited individuals involved in the research grant, including the research team, assistants, and consultants.

Research lab/center: A research lab or center, is a facility or building dedicated to conducting scientific research in various fields. These facilities can exist within academic institutions such as universities, private corporations, government organizations, or non-profit entities.

Research lab/center director: The individual responsible for the management and oversight of a research laboratory or center. They supervise research activities, manage budget and resources, provide scientific leadership, and ensure adherence to safety and ethical standards.

Research Team: A group of specialized researchers in the field of the research grant who are assigned to carry out the research as stated in the Researchers' Declaration. It consists of the Principal Investigator, Co-Principal Investigator, Researchers according to the nature of the grant, and the grant project manager.

Principal Investigator (primary applicant): A person who is academically and technically qualified and has direct expertise related to the subject of the research grant. They are responsible for managing, executing, and closing the grant.

Co-Principal Investigator: A person who is academically and technically qualified and has direct expertise related to the subject of the research grant. They act as a substitute for the Principal Investigator in case of absence or withdrawal, in addition to their responsibilities as a Researcher.

Researcher: A person who is academically and technically qualified and participates in the research team. They are responsible for the portion assigned to them in the research grant according to the Researchers' Declaration.

Project Manager: A qualified individual or experienced professional in project management who is engaged to contribute to the achievement of the research grant's objectives according to the approved timeline.

Consultant: An individual with high academic qualifications and expertise who provides scientific and consultation services in the specialized field of the research project.

Assistants: Individuals assigned with executive tasks in the research project, such as conducting experiments, analysis, and other related activities. This includes:

- **Graduate Students**: Enrolled students pursuing a master's or doctoral degree (or equivalent) directly related to the research project.
- **Technicians**: Individuals with technical and technological qualifications and expertise required to accomplish the necessary tasks.
- **Administrators**: Qualified individuals responsible for performing the required administrative tasks.
- **Professionals / Skillful Labors**: Skilled individuals from various professions necessary to facilitate professional work.

Review: The process of peer reviewing research grant proposals or periodic and final technical performance reports of supported grants, according to specific scientific criteria. This process is carried out by a group of reviewers who possess expertise, impartiality, and scientific integrity.

Reviewer: A qualified individual assigned to review proposals scientifically, assess their merit, and determine their suitability for funding. They also review the technical reports of the grant to evaluate the extent to which it has achieved the approved objectives according to the adopted timeline.

Technical Reports: Reports submitted by the Principal Investigator describing the progress of the grant towards achieving its objectives, based on the approved timeline and methodology. They are categorized into annual and final technical reports.

Financial Reports: Reports submitted by the Principal Investigator documenting the expenses of the grant according to the approved budget. They are categorized into annual and final financial reports.

Research Output: The results obtained during or after the completion of the research project. This includes scientific papers published in internationally recognized journals, granted patents, prototypes, industrial products, experimental products, computer programs, integrated circuit designs, plant varieties, copyrights, and trademarks.

Reporting Extension: A procedural process where the Principal Investigator of the research grant requests an extension for submitting periodic technical or financial reports or final reports for a specified period of time, as specified in the approved research proposal for completing the research grant.

Report Postponement: The failure to meet one of the requirements for submitting project report(s) within the specified timeframe.

Grant/Project Extension: An official administrative procedure carried out by the Authority to extend the duration of the grant for a specified period of time due to valid reasons, without additional financial obligations.

Grant Closure: A series of administrative procedures executed to conclude all activities of the research grant. It involves the official announcement by the Authority of the completion of the project, leading to the termination of the relationship between the research team and the funding entity.

Account: The bank account designated for the support funds and related financial transactions concerning the supported grants. It is used for the management and operation of the supervisory departments overseeing the support, whether within the Authority or in science and technology entities and Units.

Intellectual Property Rights: The set of organized rules that determine the ownership rights of the intellectual property resulting from the research grant and the responsibilities of the involved parties. It clarifies the obligations related to the protection, generation, management, and investment of the intellectual property resulting from the grant.

Scientific Integrity Guidelines: A set of guidelines that include scientific obligations based on fundamental and professional principles for the preparation and implementation of scientific research and its outputs, in accordance with internationally recognized scientific integrity standards.

Start-up Company: A company that is newly established, typically with the goal of developing and bringing innovative products or services to the market.

Direct / Indirect Job Creation: The creation of new jobs either directly, through the hiring of new employees, or indirectly, through the creation of new business opportunities that result in jobs being created elsewhere in the economy.

Spin-off Company: A company that is created as a result of the research and development activities of an existing company or organization.

Policy Changes: Changes to laws, regulations, or policies that are made as a result of research outputs or recommendations.

Industry Implementation: The application of research outputs or technologies in the development of new products, services, or processes within a particular industry.

Business Contract: A formal agreement between two or more parties that outlines the terms and conditions of a business transaction or relationship.

Prototypes: A preliminary version of a product or service that is created for testing and evaluation purposes.

Minimum Viable Products (MVPs): A product or service that has enough features to satisfy early customers and provide feedback for future product development.

Efficiency Gain: The improvement in productivity or resource utilization that results from the implementation of new research outputs, technologies, processes, or practices.

Table (1.AIV): Technology Readiness Level (TRL) definitions.

TRL	Stage	Definition	Hardware Description	Software Description	Exit Criteria
1	Discovery	Basic principles observed and reported.	Scientific knowledge generated underpinning hardware technology concepts/applications.	Scientific knowledge generated underpinning basic properties of software architecture and mathematical formulation.	Peer reviewed publication of research underlying the proposed concept/application.
2		Technology concept and/or application formulated.	Invention begins, practical application is identified but is speculative, no experimental proof or detailed analysis is available to support the conjecture.	Practical application is identified but is speculative, no experimental proof or detailed analysis is available to support the conjecture. Basic properties of algorithms, representations and concepts defined. Basic principles coded. Experiments performed with synthetic data.	Documented description of the application/concept that addresses feasibility and benefit, or patents.
3	Discovery/Development	Analytical and experimental critical function and/or characteristic proof of concept.	Analytical studies place the technology in an appropriate context and laboratory demonstrations, modeling and simulation validate analytical prediction.	Development of limited functionality to validate critical properties and predictions using non-integrated software components.	Documented analytical/experimental results validating predictions of key parameters.
4	Development	Component validation in laboratory environment.	A low fidelity system/component is built and operated to demonstrate basic functionality and critical test environments, and associated performance predictions are defined relative to the final operating environment.	Key, functionally critical, software components are integrated, and functionally validated, to establish interoperability and begin architecture development. Relevant Environments defined and performance in this environment predicted.	Feasibility documented test performance demonstrating agreement with analytical predictions. Documented definition of relevant environment.
5		Component validation in relevant environment.	A medium fidelity system/component is built and operated to demonstrate overall performance in a simulated operational environment with realistic support elements that demonstrates overall performance in critical areas. Performance predictions are made for subsequent development phases.	End-to-end software elements implemented and interfaced with existing systems/simulations conforming to target environment. End-to-end software system, tested in relevant environment, meeting predicted performance. Operational environment performance predicted. Prototype implementations developed.	Feasibility documented test performance demonstrating agreement with analytical predictions. Documented definition of scaling requirements.

6		Sub-system model or prototype demonstration in an operational environment.	A system/component prototype that adequately addresses all critical scaling issues is built and operated in a relevant environment to demonstrate operations under critical environmental conditions.	Prototype implementations of the software demonstrated on full-scale realistic problems. Partially integrate with existing hardware/software systems. Limited documentation available. Engineering feasibility fully demonstrated.	Model or Prototype documented test performance demonstrating agreement with analytical predictions.
7		System prototype demonstration in an operational environment.	An engineering unit that adequately addresses all critical scaling issues is built and operated in a relevant environment to demonstrate performance in the actual operational environment and platform.	Prototype software exists having all key functionality available for demonstration and test. Well integrated with operational hardware/software systems demonstrating operational feasibility. Most software bugs removed. Limited documentation available.	MVP documented test performance demonstrating agreement with analytical predictions.
8	Deployment	Actual system completed and qualified through test and demonstration.	The final product in its final configuration is successfully demonstrated through test and analysis for its intended operational environment and platform.	All software has been thoroughly debugged and fully integrated with all operational hardware and software systems. All user documentation, training documentation, and maintenance documentation completed. All functionality successfully demonstrated in simulated operational scenarios. Verification and Validation (V&V) completed.	Product validation documented test and performance verifying analytical predictions.
9		Actual system proven through successful operations.	The final product is successfully operated in an actual environment.	All software has been thoroughly debugged and fully integrated with all operational hardware/software systems. All documentation has been completed. System has been successfully operated in the operational environment.	Mass production documented and operational results.