NATIONAL RESEARCH FOUNDATION
PRIME MINISTER'S OFFICE
SINGAPORE

FCALL FOR PROPOSALS
2020 CALL 01 PROGRAMMES IN "SCIENCE OF SUSTAINABLE CITIES"

Information for Applicants

Background

1. CREATE will be adding a thematic approach to programme selection in RIE2025. The first theme on the "Science of Sustainable Cities" will be for research that will provide the tools, technologies and perspectives to consider how cities can work better and evolve to be more sustainable, liveable and resilient.

2. This call aims to draw upon the capabilities and leadership of outstanding universities and research institutions associated with CREATE to conduct cutting-edge collaborative research in the theme. Proposals that are multi-institutional are welcome. Proposals can also include experts from institutions not currently at CREATE where appropriate.

Scope of Research

3. This call is for proposals to launch a third generation of programmes at CREATE. Programmes in the first generation were typically broad in scope and setup without prior opportunity to define collaborative opportunities. Programmes in the subsequent generation have had more opportunity to emerge carrying some context in the Singapore research ecosystem. It is expected that proposals in this call will carry this trend further and embrace the opportunities for developing the best teams from the CREATE and Singapore ecosystem to address important research challenges.

4. Proposals can address the function and design of cities as a whole or choose to focus on constituent subsystems or even specific enabling technologies. Proposals can also contribute to frameworks for the conceptual understanding, planning and design, scientific assessment, and/or benchmarking of cities.

5. Cities have people in them, and the behaviour of people in the urban environment needs to be taken into consideration when designing urban systems. Hence beyond research in science and technology, proposals should include relevant social and behavioural sciences where appropriate.

6. Please refer to **Annex A** for more information on the scope and research focus of this call.

Team Composition

7. For the purpose of this grant call, each research team should comprise members with the following roles:

- Programme Leads: Programme Leads have the responsibility to guide the programme towards its goals. Each team should normally be led by 2 or more Programme Leads with different primary institutional affiliations.
- Principal Investigators (PIs) and Co-Investigators (Co-Is): PIs typically lead a thrust/work package/ project within the programme. Co-Is are investigators within the thrust/ work package/ project. Each team may include any number of PIs and Co-Is.
- Collaborators: Collaborators may include, but not limited to, persons from academic institutions, agencies or industry who can contribute to the proposal. Each team may include any number of collaborators.

8. Programme Leads and PIs should be independent researchers with a track record of leadership ability in coordinating research project(s) and providing mentorship to research team(s), as well as having a strong research track record. Programme Leads and PIs are expected to commit a proportionate amount of their time in ensuring the success of the project.

9. Each research team is strongly encouraged to include PIs, Co-Is and Collaborators from the Singapore ecosystem.

Eligibility

10. Programme Leads
    a. Programme Leads must have a CREATE CLG/entity[1] or CREATE Partner Institution[1] as their primary institutional affiliation.
    b. At least one Programme Lead must have a CREATE CLG/entity or the respective overseas partner home institution[1] as his/her primary institutional affiliation.
    c. Programme Leads from a CREATE overseas partner home institution are expected to be affiliated with the corresponding CREATE CLG/entity for the conduct of the project.
    d. Programme Leads from a CREATE overseas partner home institution will be required to comply with CREATE residency requirements.

11. PIs, Co-Is and Collaborators
    a. Researchers not affiliated to CREATE partner institutions, who can contribute to the proposal are welcome to participate as PIs, Co-Is and/or collaborators.
    b. PIs will be required to comply with CREATE residency requirements.

12. Host institution

[1] Please refer **Annex B** for definitions of terms.

a. Each proposal must nominate one Host Institution from the following institutions to take responsibility for the management of the programme: BEARS, CARES, CNRS@CREATE, SJTU-APGI, ILATSG, SEC, SHARE, SMART or TUMCREATE.
b. Each proposal must be endorsed by the Host Institution and the respective overseas partner home institution[1].

Grant quantum

13. CREATE programmes typically receive funding for five years in the first instance. Subject to the outcomes of a mandatory review, funding is available for another five years. All funding for a Programme will stop at the end of 10 years.

14. Funding support will be provided in the form of a headquarters (HQ) budget to CREATE CLGs/entities[1]. The HQ budget funds the support functions that is necessary for programme management, including IP management, HR matters, space, audit, corporate, regulatory compliance, and other costs not easily allocated to a specific research programme. No separate overhead/indirect research costs will be awarded.

15. Activities supported by this grant award should primarily be conducted in Singapore. Applicants should take into account expenses related to/required for collaborative work, including traveling to/from Singapore.

16. Applicants should provide reasonable budgets that realistically reflect what is required to execute the proposed scope of work. Where possible, existing equipment and facilities should be used. Applicants are encouraged to leverage on facilities and testbeds available in CREATE and other local institutions. Cost estimates should be credible, and an inflated budget will be viewed less favourably.

Selection Process and Evaluation Criteria

17. Grant awards will be selected through a two-stage process (refer to figure 1 below):
a. Whitepapers: Shortlisting of Whitepapers, for development into Full Proposals, by the CREATE Scientific Advisory Board (SAB); and
b. Full Proposals: Evaluation of Full Proposals by international peer reviewers, overarching review panel, and the CREATE SAB.

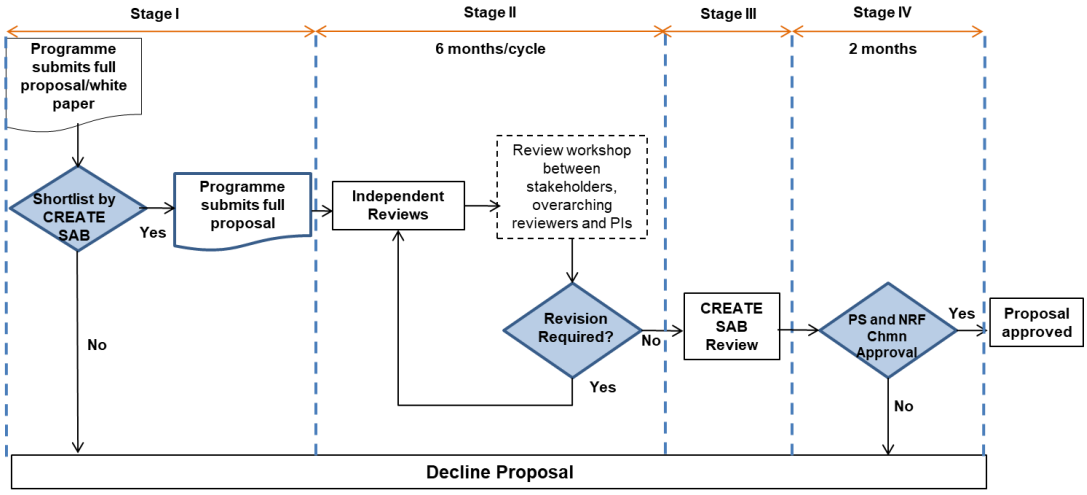

Figure 1. Selection process for proposals

18. Key assessment criteria include:

a. *Vision and Strategy*
Does the proposal present a sound, coherent vision, well-founded strategic aims and well-defined outcomes? Is the scope of the programme appropriate and do the planned activities conform to its vision and broader strategic aims? Are the topics of strategic importance that should be of the most interest to Singapore and/or the international community? Is the programme structured to respond to changes and challenges in a dynamic global/ research environment?

b. *International Standing*
Are there similar or planned programmes of comparable scale at an international level? How does this proposal compare to existing efforts? Is the research team internationally competitive? Do they have the appropriate skill sets to achieve the objectives of the programme?

c. *Research*
Are the research questions clearly defined? What are the potential scientific outcomes that are impactful, from the programme as a whole? Are there likely to be translatable or commercial outcomes? Is there clear evidence that Singapore would benefit from the outcomes of this programme (economically, socially or otherwise)? Are the proposed timelines credible? Are milestones clearly defined and quantifiable outcomes included?

d. *Programme Coherence and Potential Collaborations*
Do the projects and work packages come together coherently as a programme, such that the overall outcome is more than the sum of its parts? Is the collaboration between the Singapore and CREATE partners identifiable and are these important for achieving the programme objectives?

Are there adequate collaborations with other entities, such as other universities, industry, public institutions and agencies that could contribute to overall / greater impact?

e. *Programme Management*
Is the programme management including resource allocation and budget management appropriate? Is the proposed budget appropriate for the scope of the programme? Is the programme management structure organised to respond to unexpected changes?

19. All decisions on the selection process are final.

Submission of Application

20. Whitepapers should be submitted to NRF via email through the Host Institution's Office of Research (ORE) or equivalent. Applicants whose Whitepapers are shortlisted will need be invited to submit full proposals.

21. Whitepapers should be submitted by 31 Mar 2021, 11.59 pm (Singapore Standard Time). Whitepapers will be evaluated and shortlisted by the CREATE scientific advisory board for development to full proposals by mid- 2021

22. The timeline and submission deadlines are as follows:

• Submission of Whitepapers	**31 Mar 2021**
• Shortlisting of Whitepapers for development to full proposals	**Mid- 2021**
• Submission of full proposals	**When ready**
• International peer review and overarching review of full proposals	**Expected to require about 6 months per iteration**
• CREATE SAB evaluation of proposals for award	**The SAB meets twice a year and is the final step for the scientific endorsement of the proposal**

Instructions for submission of Whitepapers

23. Interested applicants should prepare their Whitepapers using the guidelines provided in **Attachment 1**.

24. Host Institutions should submit softcopies of completed Whitepapers (only in PDF format) to NRF via email by the stipulated deadline:

- tan_jen_jen@nrf.gov.sg
- poh_wei_theng@nrf.gov.sg

25. The following will be rejected without review:

- Incomplete applications (e.g. sections left blank, missing CVs, etc.);
- Inappropriate format (e.g. template not used, small font size, tight para spacing, etc.);
- Late submission;
- Missing or incomplete endorsements by respective Director of Research (or equivalent) of Host Institution and/or overseas partner home institution
- Revisions made after closing date;
- Proposal not within scope of grant call theme;
- Duplicates of proposal submitted to any other public funding agencies for simultaneous consideration;
- Ineligibility of Programme Leads, PIs, Co-Is or collaborators compositions;

Instructions for submission of Full Proposals

26. Submission of full proposals will be ***by invitation only,*** following the CREATE SAB shortlisting process in mid-2021.

27. Detailed administrative information on full proposal submission will be provided to shortlisted applicants.

Contact Information

28. For enquiries related to the Grant call, please contact:

- Dr Tan Jen Jen (tan_jen_jen@nrf.gov.sg) or
- Dr Poh Wei Theng (poh_wei_theng@nrf.gov.sg) or

Annexes and Attachment

Annex A	Grant Call for CREATE programmes- 2020 Call 01 Scope for "Science of Sustainable Cities
Annex B	Definitions
Attachment 1	Grant Call for CREATE programmes- 2020 Call 01 Whitepaper Template

ANNEX A

CALL FOR PROPOSALS
2020 CALL 01 PROGRAMMES IN "SCIENCE OF SUSTAINABLE CITIES"

SCOPE

It is projected that by the end of this century, most of the world's population will be living in one type of city or another. Cities have dramatically expanded their physical and ecological footprints. Cities are not simply places in space, or a collection of people, but are systems of complex networks, interactions, relations, and flows –at the engineering systems level, physical objects level, at the people level and in the case of city-states like Singapore with a span well beyond national boundaries. The interdependencies between systems dictate that addressing the challenges of urbanisation requires an iterative loop between science, urban design, engineering, public health and governance at multiple spatial and temporal scales. The pandemic now raging around the world will require a re-examination of the basis of much of what was thought important for a city to be sustainable and resilient. One of the biggest challenges will be planning for the unexpected.

The focus of this grant call is for research that will provide the tools and perspectives to consider how cities can work better and evolve to be more sustainable, liveable and resilient. As an example, Singapore has taken a systems approach to transform from an overcrowded city with severe challenges from drought, flooding, pollution, disease etc with less than 2 million people in the sixties to a much more liveable and sustainable city of 5.7 million people today. Nevertheless, existential challenges remain, ranging from pandemics to climate change and technological risks that can threaten key urban systems. Hence Singapore is both a model and a test bed from which research of potentially high impact and relevance can be conducted.

Proposals can address the function and design of cities as a whole or constituent subsystems, or specific enabling technologies. Proposals can also contribute to frameworks for the conceptual understanding, planning and design, scientific assessment, and/or benchmarking of cities. This will help to formulate "the blueprint" for the implementation of operational processes.

Cities have people in them, and the behaviour of people in the urban environment needs to be taken into consideration when designing urban systems. Hence beyond research in science and technology, proposals should include relevant social and behavioural sciences where appropriate.

Some examples of areas within the theme are listed below, but we welcome proposals beyond the areas indicated.

Liveability- Solutions to expanding Urbanisation and densification

- City Design- Research should inform the design of cities, which impacts the function and evolution of cities, which is in turn tightly coupled to planning and implementation by government and key stakeholders. The design and planning of a city, including considerations for a city in its environment and its links with the suburbs, society and communities, need to be based on a lattice of many different disciplines and perspectives, aided by tools that can be applied to understanding the multi-faceted aspects of city structure and function. An area of research of relevance to Singapore is consideration of the natural habitat and wildlife in urban planning. Covid-19 is a sharp reminder that pandemic preparedness is another one of those facets.
- Dense cities- Liveability is affected by several factors, including infrastructure-related considerations such as quality of public spaces, accessibility to public transport, land-use diversity and flexibility, proximity to healthcare and schools, human flows and interaction etc. A sound methodology and framework, coupled with the aid of digital planning tools and socio-behaviour studies, are important to help cities take stock of liveability, understand the interactions between infrastructure (e.g. transport systems) and human behaviour, and help cities make appropriate infrastructure planning decisions to maximise the convergence of various features (e.g. identifying indicators for measuring accessibility and connectivity or qualities for vibrant public spaces and human interactions) that make a place liveable and vibrant. Research that takes into consideration social well-being and quality of life, including the selection and definition of appropriate indicators should also be considered.

Sustainability

- Urban sustainability- Cities account for over 60% of resource use. It is crucial that a delicate balance between liveability, economic viability, and sustainability be established. An understanding of urban metabolism- the flows of energy and materials within and between various systems of a city, will provide a robust framework to study the interactions between natural and human systems. For the latter, economics, including the nexus between accessibility and equity of opportunities, such as the affordability of housing and mobility, should be considered. This will allow cities to choose the best ways to minimise the use of natural resources and production and/or upcycling of waste, while not compromising liveability and quality of life of its inhabitants.
- Circular future cities- The Circular Economy vision may be widely accepted by many governments and industry, but the blueprint and operational examples to achieving that is missing. Research could contribute options with lower environmental impact and maximum benefits for sustainability- for example, through the understanding of resource flows between firms/ industrial sectors within and beyond a district; or understanding the interdependencies between different stakeholders (e.g. influence of regulations/ incentives on businesses'

circular economy models, consumers' adaptive/ reactive behaviour towards business' circular economy models through agent-based models).

- Urban climate management - A part of urban sustainability includes countering the effects of climate change for dense cities. Energy is a central player to the climate challenge. For example, nature-based solutions such as novel green technologies that enable introducing greenery systems into a dense urban fabric could be explored as a potential solution for mitigating the Urban Heat Island effect. The rapid development of 5G technology, Internet of things, cloud technology, big data, Artificial Intelligence, etc., will revolutionise future energy systems and power grids- from energy producer-consumer independence to integration, renewable energy from supplementary energy to mainstream energy. Intelligent energy system, energy internet and solar fuel will play an increasingly important role in the future city and urban climate management. Transformations that advocate cleaner, renewable energy, and technologies for decarbonisation will be a step towards carbon neutrality, transforming not only the energy sector, but many other closely coupled sectors- food production, security, transport, health, etc.

Resilience- Enablers for secure, healthy and resilient cities[2,3]

- Resilience- Dense cities consist of interdependent networks of advanced systems. Understanding the interacting dynamics and feedback loops within these networks is critical to urban resilience. For example, the ongoing Future Resilient Systems (FRS) programme at the Singapore ETH Centre aims to identify and quantify the impact of disruptions to flows across systems and make high density urban systems more robust and resilient. In addition to infrastructure and physical resilience, social and urban resilience should also be taken into account, and external factors such as societal and behavioural shifts, human behaviour, and climate change should also be considered.
- Public health- Public health issues confronting cities today are increasingly complex and require multiple levels of interventions. Healthy urban planning focuses on the positive impact that urban planning can have on human health, wellbeing and quality of life. Tools such as epidemiology modelling & studies, biostatistics & modelling, health systems and behavioural sciences studies, etc. with a strong urban geospatial angle can enable the translation of science and technologies into healthier communities and facilitate an informed response to emergencies such as the COVID-19 pandemic. Proposals could also consider methodologic themes such as community based participatory research as a means toward establishing novel health promoting frameworks and settings. Singapore's geographical location in the tropics and its well-established health system could provide a lens through which to select unique research challenges

[2] Report to the President, Technology and the Future of Cities (February 2016), President's Council of Advisors on Science and Technology
[3] The Future of Cities, European Commission https://urban.jrc.ec.europe.eu/thefutureofcities/tech-and-the-city#the-chapter

(e.g. how climate change impact tropical infectious disease) that could contribute to a big proportion of the world's population.

- Food- Global food demand is projected to rise as the global population grows. The growing food demand may not be met by global food production, which faces uncertainty due to climate change, dwindling resources such as arable land, fish stocks, energy, freshwater supply, labour, and pests and diseases. The resilience of distributed food supply chains for urban populations and how they might have to be rapidly reconfigured may not be properly understood. Research is needed to better understand the food-water-energy-environment interactions, and to understand the extent of the vulnerability, propose potential technological (e.g. sustainable alternative to animal proteins, urban farming solutions and agri-technologies) and behavioural approaches (e.g. through the involvement of public perceptions and consumer behaviour) to address the vulnerability, and the role Singapore can play in improving regional and urban food resilience. Researchers may also leverage the huge advances in data science and artificial intelligence to the areas of food production, design of smart, efficient and resilient food supply chains, and food security.
- Cybersecurity and Information networks- Many critical infrastructure assets including healthcare, energy supply, transportation, defence, industrial plants etc. are monitored and controlled by cyber-systems and networks, coupling physical flows with that of information. The COVID-19 pandemic has highlighted the importance of rapid, transparent, and effective informational flow between health establishments and the public, a challenge that is compounded by the differing receptivity of a heterogeneous society. Research on information flow and interdependencies studies with an urban lens will contribute to operations and system resilience.
- Harnessing technologies for cities- The urban ecosystem can benefit from the integration of a wide array of rapidly evolving technologies. Recent developments in big data, computational modelling and machine learning that can help understand and predict city processes are obvious examples. Others include systems that increase energy efficiency, technologies for waste and water management, communication technologies that enhance connectivity, new ways for farming and manufacturing, intelligent mobility solutions etc. Since most cities gradually evolve, rather than grow from green field sites, technologies of interest also include those that can facilitate the conversion or rebuilding of existing infrastructure. Examples of such technological tools are those that can build digital twins, at a high level of spatial resolution, with the accompanying simulation and visualisation platforms, of the layers of infrastructure that are present in most established cities.

Important Considerations

- Synergies with existing efforts- Proposals should be cognisant of other relevant efforts in Singapore, including those underway at CREATE, and around the world, and collaborations, where appropriate, are encouraged. The track record

of the research teams and the capitalisation of lessons from previous projects should be considered. The proposals should not be incremental extensions of existing CREATE programmes.

- Pathway to impact- Proposals should identify where possible, key stakeholders who will help to frame the research challenges.
- Pathways of change- In planning and policy, social complexities compounded by complex interdependencies result in wicked problems Proposals should therefore consider appropriate pathways of change that can take advantage of the Singapore context. It is important the research generate options- disruptive technologies can positively affect many aspects of city living, but often only when supported by appropriate social innovation and accompanying behaviour change.

ANNEX B

GRANT CALL FOR CREATE PROGRAMMES
DEFINITIONS

For the purpose of the Grant call, the terms used in the application guide are defined as listed below.

CREATE Partner Institutions refer to the following:

University of California, Berkeley (UCB)
University of Cambridge
Centre National de la Recherché Scientifique (CNRS)
ETH Zurich
Hebrew University of Jerusalem (HUJ)
Massachusetts Institute of Technology (MIT)
Shanghai Jiao Tong University (SJTU)
Technical University of Munich (TUM)
University of Illinois at Urbana-Champaign (UIUC)
National University of Singapore (NUS)
Nanyang Technological University (NTU)

CREATE CLGs/entities refer to the following:

BEARS	E2S2	SHARE
CARES	ILATSG	SMART
CNRS@CREATE	SEC	TUMCREATE

Respective overseas partner home institution of CREATE CLG/entity refer to the following:

CREATE CLG/entity	**Overseas Partner Home Institution**
BEARS	University of California, Berkeley (UCB)
CARES	University of Cambridge
CNRS@CREATE	Centre National de la Recherché Scientifique (CNRS)
E2S2	Shanghai Jiao Tong University (SJTU)
ILATSG	University of Illinois at Urbana-Champaign (UIUC)
SEC	ETH Zurich
SHARE	Hebrew University of Jerusalem (HUJ)
SMART	Massachusetts Institute of Technology (MIT)
TUMCREATE	Technical University of Munich (TUM)

CREATE Programmes refer to the following:

Singapore-Berkeley Building Efficiency and Sustainability in the Tropics (SinBerBEST)
Cambridge Centre for Carbon Reduction in Chemical Technology (C4T)

Centre for Lifelong learning and Individualised Cognition (CLIC)
Future Cities Laboratory (FCL)
Future Resilient Systems (FRS)
Future Health Technologies (FHT)
Towards Innovative Manufacturing with Advanced Materials for Energy and Energy-Water Nexus (NEW-CREATE)
Molecular Mechanisms Underlying Inflammatory Diseases (MMID)
Future Urban Mobility (FM)
Low Energy Electronics Systems (LEES)
Antimicrobial Resistance (AMR)
Disruptive, Sustainable Technologies for Agricultural Precision (DiSTAP)
Critical Analytics for Manufacturing of Precision Medicine (CAMP)
Towards the Ultimate Public Transport System (TUMCREATE)
Energy and Environmental Sustainability Solutions for Megacities (E2S2)
Trustworthy and Secure Cyber Plexus (TSCP)

(list of programmes up to date as of Nov 2020)

NATIONAL RESEARCH FOUNDATION
PRIME MINISTER'S OFFICE
SINGAPORE

CALL FOR PROPOSALS– WHITEPAPER SUBMISSION
CALL 01 – PROGRAMMES IN "SCIENCE OF SUSTAINABLE CITIES"

All information is treated in confidence. The information is furnished to the National Research Foundation with the understanding that it shall be used or disclosed for evaluation, reference and reporting purposes.

SECTION I: All fields are mandatory.

Proposal Title: XX

Host Institution ***(please indicate only one):*** XX

Research Budget Requested *(Excluding Headquarters Costs)*: **S$** XX

	Project Team Members *(Please add/delete rows where necessary)*				
Role	***Name***	***Primary Affiliated Institution***	***Existing participation in CREATE Programmes***[1]	**% effort within project**[2]	**% of time committed on the project**[3]
Programme Lead (1)					
Programme Lead (2)					
PI (1)					
PI(2)					
PI(3)					
Co-I (1)					
Co-I (2)					
Co-I (3)					
Collaborator (1)					
Collaborator (2)					
Collaborator (3)					
			Total:		

[1] State involvement in all programmes; indicate "N.A." if not participating in any.
[2] Represent % effort spent by the researcher in the project relative to his/her other team members. **The total must add up to 100%.**
[3] Represent % effort spent by the researcher in the project relative to his/her other job scope.

SECTION II

Content in this section **must not exceed 10 pages, including figures, tables and charts; otherwise the application may be rejected without review**. All parts must be completed; make use of the guiding questions to provide the most pertinent information for assessing your proposal. **Please use Arial font size 12, single line spacing and the default margins of this document.**

Please provide the following documents as Annexes (not subject to the 2-page limit):

- Annex A – References: a listing of all references listed in the application; the citation format used should show the full titles of articles referenced.
- Annex B – CVs: CVs of all team members (Programme Leads, PIs, Co-Is and Collaborators, 2 pages per CV) should be compiled and attached as single annex. CVs should follow the format provided at the end of this template.
- Annex C- Supplementary info: Additional information or details that supplement the whitepaper.

A. Research Objectives: *What problem are you trying to address? Clearly state the problem to be addressed and explain why it is an important scientific challenge; how it might be significant to society and of strategic relevance to Singapore or a broader international community. How do the projects come together to contribute towards achieving the research objectives of the programme? Use neither jargon nor acronyms.*

B. Assessment on Current Development: *How is it done today, who are the leading researchers studying the problem, and what are the limitations of their current approaches? Are there other/previous efforts (including in Singapore) that you are aware of? Provide a competitive scan of existing state-of-the-art developments and compare your proposed technology/system/solution in quantitative terms. Describe previous and ongoing works, preliminary results, etc, providing all necessary details that would help support this proposal.*

C. Proposed Approach: *What is your approach and does this differ from what others are doing? What is the potential for scientific breakthroughs or disruptive innovation arising from your approach? Why do you think your proposed approach will be successful? What are the technical risks and how would these be mitigated? Outline the schedule for all phases of the proposed programme. How will the project address pathways of change required for the innovation to be actionable and scalable?*

D. Programme Management Plan: *Description of how the programme will be managed. How are financial and human resources organised to accomplish the objective? Is the programme management structure organised to respond to unexpected changes? What is the plan for training Post-Docs and Graduate Students?*

E. Role of team members: *What are the roles and contributions of the team members and collaborators? What are the track records and capabilities of the Programme Leads and PIs, which are relevant to the research programme? How are the collaborator(s) augmentative and relevant to the research programme?*

F. Synergy: *How do you intend to collaborate (or not) with researchers in Singapore who are currently working in this problem? How does the proposal leverage on existing efforts in Singapore to achieve the proposed objectives? How do the collaborations between the disciplines, institution or with industry add value to the project? How does the collaboration produce results that cannot be achieved by the components acting alone?*

G. Outcomes & Deliverables: *What are the scientific milestones/ metrics that can be used to appropriately measure project progress and success at completion of the project? Be quantitative if possible (e.g.: a 2X*

improvement, or a specific achievement). Explain what impact success of the project would be for the economy and/or society, and how it would generate value for Singapore.

SECTION III: PROPOSED RESEARCH BUDGET (excluding Headquarters Costs)

Content in this section should not exceed 1 page. The amount requested for each budget line item must be documented and justified in the "Description" column.

Budget Category	Description	Budget(S$)
Expenditure on Manpower (EOM)	*What are the types, amounts, and costs of manpower required for this program? Link the manpower allocations to the proposed milestones.*	
Expenditure on New Equipment	*What equipment and supplies are required to succeed? Explain why existing infrastructure is unsuitable or unavailable where new purchases are proposed.*	
Other Operating Expenses (OOE)	*What are the types, amounts and costs of other operating expenses (e.g. consumables and materials) required for this program? Link the operating expenses to the proposed milestones.*	
Travel	*What is the travel budget per headcount per year for international conferences, meetings with collaborators and/or industries, etc.? Explicitly link travel expenses to milestones.*	
Total Research Costs (S$): ***This figure must tally with the budget requested on the cover page.***		
Please indicate existing resources, equipment and post-graduates funded by other sources that will be involved in this project (if any).		

SECTION IV: OTHER FUNDING SUPPORT

All grants currently held or being applied:

Please provide the details (all fields are mandatory) for all currently held or applied grants by the Programme Leads, PIs and all Co-Is listed on the cover page (not required for collaborators). These include those **supported by and/or applied** to universities, other public funding agencies and foundations. Please indicate "N.A." for any member with currently no awarded grants or grants being applied for. Note that all Lead PIs and all Co-Is must be accounted for under this section.

S/N	Grant Call ID/Project Number	Grant Title and Title of Supported Project	Funding Agency	Status (Awarded/Applied)	Total Amount Awarded/ Applied for (S$)	Funding Awarded to	Years of Support	Grant End Date (dd/mm/yyyy)

If any of the currently held grants above fund research topics related to this proposal, please include a one-page supplementary write-up as an annex. The one-page supplementary write-up should provide a succinct description of the research funded by these grants, and how the objective(s) and research differ from that in this proposal.

SECTION V: DECLARATION BY GRANT APPLICANTS

In signing this grant application, the **Programme Leads, PIs and Co-Is** UNDERTAKE, on any grant award to:

- Not send similar versions or part(s) of this proposal to other agencies for funding;
- Be actively engaged in the execution of the research;
- Comply with the provisions of any relevant laws of the republic of Singapore, statutes, regulations, by-laws, rules, guidelines and requirements applicable to it, as well as all applicable policies and procedures adopted by NRF as the same may be amended or varied from time to time; and
- Agree to hold primary responsibility for the responsible conduct of research, and shall abide and comply with the ethical, legal and professional standards relevant to research, in accordance to the research integrity policy of the Host Institution.

We declare that the facts stated in this application and the accompanying information are true. This is an original and latest version of the proposal. We also declare that no other versions of this proposal (or parts thereof) with similar objectives, scope, deliverables or outcomes have been or will be submitted to any other funding bodies.

Name of Applicant	Signature	Date Signed
Programme Lead (1) <Name of Applicant>		
Programme Lead (2) <Name of Applicant>		
Principal Investigator (1) <Name of Applicant>		
Principal Investigator (2) <Name of Applicant>		
Co-Investigator (1) <Name of Applicant>		
Co-Investigator (2) <Name of Applicant>		

Please add/delete rows as necessary.

SECTION VI: INSTITUTIONAL ENDORSEMENT

1. Nominated Host Institution

This section should be completed by the Designated Authority of the nominated Host Institution:

- **Director / CEO*** if Host Institution is a CREATE CLG/entity.

In signing the Grant Application, the Host Institution UNDERTAKES to:

- Confirm the accuracy and completeness of the form submitted.
- Ensure that the budget is appropriate and reasonable (e.g. no double funding / excessive purchase of equipment), and is aligned with the Host Institution's HR and other policies.
- Ensure that the proposed research will be driven by the Host Institution.
- Provide adequate resources to the applicants for the entire grant period.
- Ensure that the funds provided are used for appropriate purposes, and in alignment with the Terms and Conditions laid out in the Letter of Award.
- Ensure that the research complies with all the rules and regulations pertaining to the Host Institution's operating procedures and guidelines.

_____
Name and Signature of Director of Institution*
Date:

*** If the Director/CEO of the Institution is a Lead Principal Investigator** in this proposal, undertaking by the Director/CEO's Reporting Officer is required.

_____
Name, Designation and Signature
Date:

2. Overseas partner home Institution

This section should be completed by the Designated Authority of the overseas partner home institution .

- *UCB for BEARS; University of Cambridge for CARES; CNRS for CNRS@CREATE; UIUC for ILAT@SG; ETH Zurich for SEC; HUJ for SHARE; MIT for SMART; TUM for TUMCREATE; and SJTU forSJTU-APGI.*

In signing the Grant Application, the Institution:

- Acknowledges and endorses the Programme Lead's participation in this grant call.
- Will provide appropriate resources and support to the applicants for the entire grant period.
- Confirms the accuracy and completeness of the form submitted.

_____

Name and Signature *
Date:

ANNEXES

Please attach the following annexes in pdf format, together with the Whitepaper submission:

Item	Remarks	Description
Annex A	Mandatory for all applications	References: a listing of all references listed in the application. The citation format used should show the full titles of articles referenced.
Annex B	Mandatory for all applications	CVs of all team members (Lead PIs, Co-Is and Collaborations, 2 pages per CV) compiled and attached as single annex. CVs should follow the format provided at the end of this template
Annex C	Mandatory if this application is related to currently held grant(s).	Describe the research funded by currently held grant(s), and how the objective and research differ from that in the application. Refer to Section IV: Other Funding Support

CURRICULUM VITAE

Please use the format below to provide key information on the Programme Leads, PIs, co-Is and collaborators which are relevant for the evaluation of the proposal. The CV submitted for each applicant **must not exceed 2 pages**.

1. Personal Details
    a. Name
    b. Title
    c. Office Mailing Address
    d. Email
    e. Contact No.

2. Current Position
   (Please provide full details, e.g. primary appointment; joint appointments; other academic appointments including those outside of Singapore. Please include the percentage of time spent in Singapore every year, if applicable.)

3. Employment History

4. Academic Qualifications
   (Please indicate institution's name and year the degree was awarded)

5. Research interests

6. Publications
   (Please include the 5 most important publications in the last 5 years that pertains to the proposed project.)

7. Patents filed
   (These may be related or unrelated to the study.)

8. Professional Awards

9. Research Outcomes
   (*Please include a half-page summary of the most relevant research outcomes from all previous grants, if applicable*.)