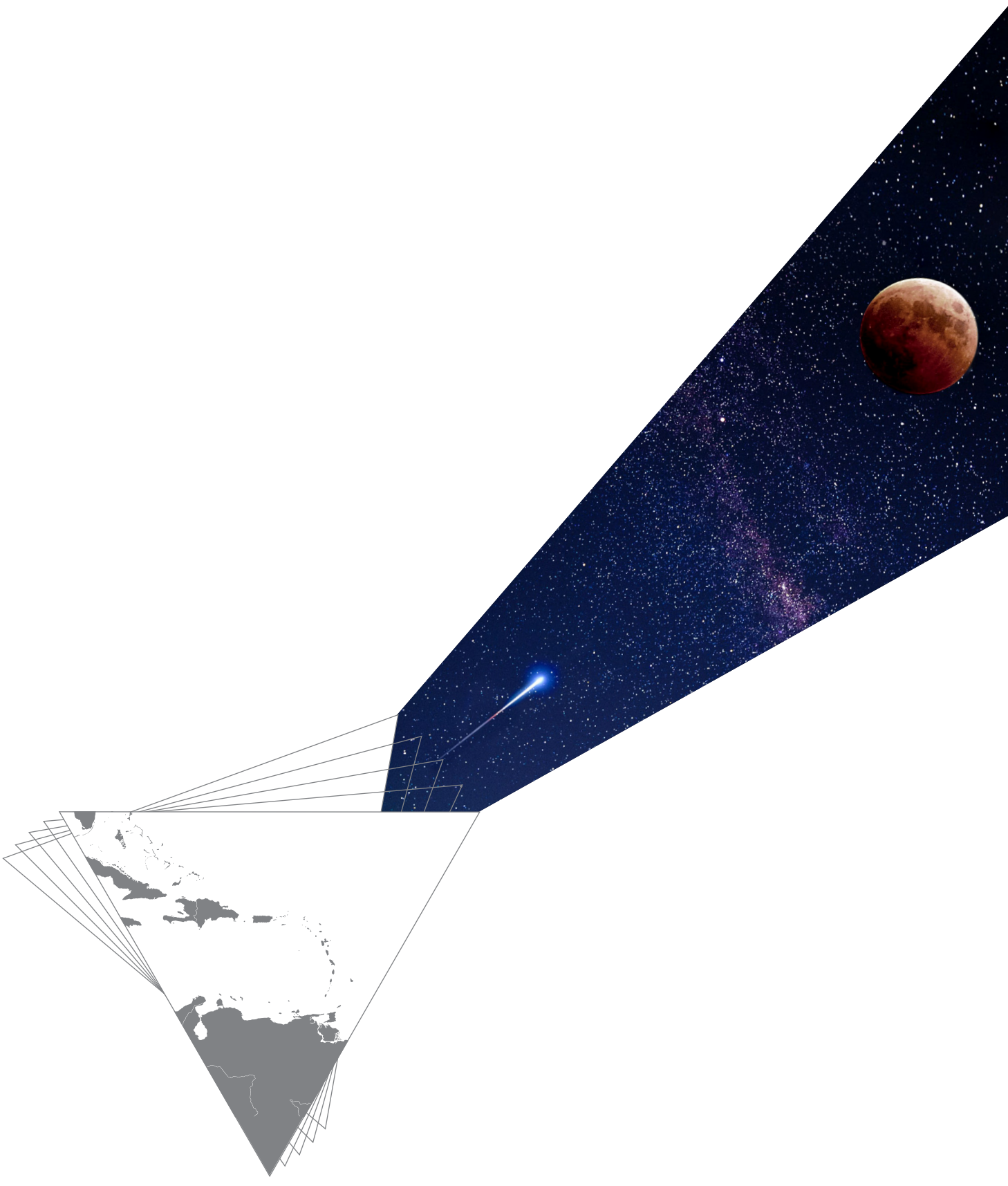
THE PIVOT ROADMAP

From Dreams to Reality



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Cover art- Night sky adapted from: Photo by Nick Owuor (astro.nic.visuals) on Unsplash.

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Acronyms

CDB	Caribbean Development Bank
CREDP	Caribbean Renewable Energy Development Programme
CTO	Caribbean Tourism Organisation
EECi	Economic Expertise & Consulting International
ESS	Energy Storage Systems
EV	Electric Vehicles
FMI	Future Market Insights
GDP	Gross domestic product
GHG	Greenhouse-gas emissions
ICE	internal-combustion engine
ICT	Information and communication technology
IDB	Inter-American Development Bank
IFPG	Innovation, Firm Performance, and Gender Survey
ILO	International Labour Organization
IP	Intellectual Property
OECD	Organisation for Economic Co-operation and Development
OSI	Online Services Sub-Index
SME	Small and Medium Enterprises
UN EGDI	United Nations E-Government Development Index
UNWTO	United Nations World Tourism Organization

Introduction

The objective of this report is to present an actionable programme to bring initial moonshot ideas into fully accomplishable projects, ready to be deployed. It comprises three parts.

The first part, namely Section 2, provides a background and development avenues for three broad domains of Caribbean economies, namely electric vehicles, digital transformation, and tourism.

The second part breaks down the realisation of moonshot ideas into steps using a comprehensive roadmap, which lays out, in sequential point-by-point form, how to steer the coherent long-term deployment of moonshot ideas into concrete actionable projects. Sections 3.1 (From Dreams to Deployment) and 3.2 (Overview of Sequential Tasks by Stakeholder Category) present this in detail.

Finally, in the third part, Sections 3.3 and 3.4 define and illustrate the roadmap of moonshot ideas identified during the PIVOT Event. In elaborating these two sections, key emphasis was put on the tasks to be conducted during the preparedness phase (Phase 2 of the roadmap).

The conclusion summarizes all dimensions of the roadmap into three illustrations, one for each domain, depicting all nine moonshots from the PIVOT Event.

Background and Development Avenues in Three Domains of Caribbean Economies

The following briefs review three broad domains of Caribbean economies that would most benefit from renewed attention, fresh ideas, and, ultimately, greater economic and social growth.

2.1 Electric Vehicles

2.1.1 Background

As environmental concerns grow worldwide, one of the main targets in reducing greenhouse-gas emissions (GHG) is transport. Petroleum products represent 95% of the world's transportation energy, the Caribbean included. Due to higher levels of per capita GHG emissions, the Caribbean population contributes proportionally more to their production than many other countries, individually or grouped. In fact, despite its per capita GDP reaching only 23% of that of OECD countries, the Caribbean's per capita GHG emissions attain by contrast 96% of the rate produced by these same countries. Furthermore, the same per capita indicator in the Caribbean is respectively 2.3 and 2.9 times higher than the one of middle-income countries and the one measured for Latin America and the Caribbean combined.

To minimise GHG emission levels, an ideal scenario would see the conversion of internal-combustion engine (ICE) vehicles to battery-electric vehicles. The worldwide share of electric cars is projected to be 15% by 2025.[1] Some governments, notably Britain and France, have already committed to prohibiting the sale of new ICE cars by 2040.

Otherwise, while road freight also constitutes a major part of ICE use and GHG emissions, a realistic transition of these larger vehicles to electric propulsion has yet to be put in place. Researchers have estimated that for a truck with a driving range of about 600 miles, the battery system necessary would cost more than $200,000, and weigh more than 10 tons. This would significantly reduce the truck's maximum permitted freight capacity.[2] The focus of this text will be on the opportunity of developing electric mobility.

The successful transition to electric vehicles in the Caribbean requires three main conditions: a) there needs to be a sufficiently wide supply of different vehicle models, including lower cost ones, a condition which rests mostly in the hands of major automakers; b) a significant demand shift from cars to other electric vehicles such as carts, scooters, tractors, etc. will need to be undertaken, and the availability of a corresponding supply as well to meet this demand; and c) a wide and efficient recharging network for all electric vehicles, including residences, should be put in place, ideally with its electricity produced from clean and renewable energy sources. Other elements to consider are how this shift from one propulsion mode to another will impact the status quo in other areas, like, for example, taxation, gas stations, commercial vehicles (e.g., light trucks, taxis), public and private charging stations, maintenance, repair service companies, and so on.

2.1.2 Problems and Opportunities

Wide adoption of electric cars in the Caribbean is not yet feasible given the current infrastructure. Much of the energy used comes from fossil fuels, with renewable resources playing a

[1] The Economist, Big carmakers are placing vast bets on electric vehicles, April 17th, 2019.
[2] https://pubs.acs.org/doi/pdf/10.1021/acsenergylett.7b00432.

minor role. However, because sun and wind are abundant, as are geothermal energy and hydropower, the potential of renewable energy for the Caribbean is considerable. Of note, renewable energy costs continue to trend downwards. Also, increasing the share of this type of energy would reduce fossil fuel imports, which represent nearly a quarter of the Caribbean's merchandise imports, and constitute a sizeable source of global pollution.

The naturally variable production of solar and wind energy, combined with the Caribbean's weak grid infrastructure, will require energy storage systems (ESS) be implemented to control frequency, voltage regulation, and ramping. Even though ESS are costly, their price point is continually decreasing. In this context, the recharging needs of electric vehicles, although only met partially at this time, can complement the variable production of electricity from renewables, notably with proper pricing. As of September 2018, seven ESS were operational in the Caribbean, and another 11 were proposed, for a total projected installed capacity of 65 MW, at a projected cost of US$ 80.4 million.[3] However, data about these systems is incomplete. The implemented capacity and revenues stemming from these ESS in Latin America and the Caribbean (population: 1.1 % of Latin America) is expected to double over the coming five years.

For the deployment of ESS to make sense, renewable energy production also needs to grow. With Suriname, Jamaica, and the Dominican Republic leading the way, most Caribbean countries possess a certain capacity for renewable energy production, although not all are equipped with ESS. Many of these projects are financed by large international players, such as the Clinton Climate Initiative, the Rocky Mountain Institute, and the United Arab Emirates.[4] To contribute to this development, the Caribbean Community (CARICOM) Secretariat has launched the Caribbean Renewable Energy Development Programme (CREDP), which aims to remove the barriers to renewable energy and foster its development and commercialisation. Its mandate covers the following: policy (including legislation and regulation), capacity building (institutional and individual), information, and financing.

Private initiatives are also being developed. For example, the Caribbean-based equity firm MPC Caribbean Clean Energy Ltd., established in 2017, helps private and institutional investors from Jamaica and Trinidad and Tobago to put their money in one of the few funds that invests in renewable energy projects in Jamaica, Trinidad and Tobago, and the wider Caribbean region.

In addition, non-car electric vehicles can be produced on a reduced scale and may be less dependent on the development of the grid. Some of these vehicles, which are smaller than a car, can also be more adapted to the current state of road infrastructure. This type of production may attract smaller investors, who may be less anchored and more amenable to a variety of locations across the Caribbean.

Besides renewable energy production and storage, another major technical challenge (and opportunity) is installing enough recharging stations that are properly distributed geographically, and which are efficient enough in terms of charging speed to constitute a viable and practical alternative to ICE vehicles. While at first this deployment may be easier to pursue in urban or more densely populated areas, it should also be planned for rural and less-populated areas. Likewise, the configuration of these stations should be flexible enough to accommodate

[3] https://www.researchgate.net/publication/328030940.

[4] See note 2.

the inevitable technological changes that will improve their efficiency over time. For example, charging cars wirelessly is becoming an increasingly realistic possibility, which would require updating existing cable-based recharging stations.[5]

2.1.3 Current Regulatory and Legal Environment

Electric vehicles essentially possess the same functionalities ICE vehicles do, minus the deleterious effects of their use through GHG emissions, noise levels, and other external phenomena. Therefore, as ICE vehicles are already widely used in the Caribbean, there is little or no need to change permit or licensing regulation to facilitate their wide-scale adoption. Therefore, the main policy and regulatory focus will be on infrastructure: reinforcing and expanding all elements of grid infrastructure, as well as regulation on public and private charging stations.

Several policy initiatives related to renewable energy are ongoing in many Caribbean countries. However, the size and technical complexity of these projects, coupled with their importance across all sectors of the economy, make them challenging to develop. In this perspective, the successful expansion of the wind energy industry in developed countries (public tenders, regional spending requirements, operators paid for electricity delivered) could be a useful model to follow.

In line with the comparison between ICE and electric vehicles, any type of charging station represents an urban and environmental improvement over conventional gas stations. Therefore, adapting and modernizing existing land use to encourage the development of these stations should not represent a significant challenge for regulators.

Lastly, considering the existing taxes on petroleum products, governments would need to replace a portion of this revenue with another stemming from additional electricity sales, as well as from other forms of taxation. However, a financial margin needs to be conserved to create incentives and programs that will encourage individuals and entrepreneurs to switch to electric vehicles.

2.1.4 Avenues to Facilitate Success

Besides the elements mentioned above, a key component of this successful transition will be to properly match the growth in electric vehicles with that of recharging facilities. On this subject, recharging capability must progress faster than demand to both encourage the adoption of electric vehicles and send a clear signal of the country's aim for the future of road transport. Doing so will require close and continuous monitoring of the existing stock of vehicles, notably by accounting for age by type of vehicle; the probability of replacement as a function of age and vehicle type; and the availability of a wide array of electric vehicles to satisfy the expected shift in demand.

It will be also important to address the needs for peripheral goods and services to support the long-term adoption and growth of electric vehicle fleets, such as access to replacement parts for cars and charging stations, properly trained mechanics to maintain these vehicles and stations, and so on.

[5] The Economist, Wireless charging of cars looks increasingly promising, May 14th 2020.

2.2 Digital Transformation

2.2.1 Background

In recent decades, the accelerated development of digital technologies has transformed nearly every sector and aspect of our daily lives. It has reshaped our work practices and environments, provided instant access to droves of public and private information, simplified international trade, and facilitated learning and socialization. Electronic commerce, and its counterpart, electronic payments, are now commonplace in many countries. Notably, they have enabled a means for manufacturers and retailers to survive the pandemic, and consequently have given locked-down consumers access to many products. Video-sharing platforms have become an increasingly significant source of entertainment and education. Video games now occupy a significant portion of leisure time, especially for the younger population. In 2020, audio and video social interactions rely increasingly on IP communication. Artificial intelligence, machine learning, robotization and automation are here to stay and will continue to have an impact on this profound and fast-paced transformation.

The Caribbean has adopted several of these digital innovations, but nevertheless still lags behind the rest of the world in many regards. While fixed broadband subscriptions have increased yearly by 8% to 10% since 2010, their absolute level of 15.3 subscriptions per 100 people remains at about half the level observed in OECD countries. In comparison, mobile cellular subscriptions per capita are now at nearly 90% of levels observed in high-income, European, and North American countries. These are positive results. However, the proportion of individuals using the Internet in the Caribbean is estimated at only 50%, a fairly low level relative to cellular uptake. Unsurprisingly, exports of information and communication technology (ICT) goods represent less than 0.5% of total exports, while imports of these ICT products come in at less than 5% of the total—indicating real room for growth.

In this context, digital technologies offer significant opportunities to stimulate productivity and improve quality of life across Caribbean economies. While it may not yet be realistic to expect a stream of breakthrough innovations from the region, a much broader appropriation of these technologies by firms, workers, consumers, and the public sector is to be anticipated. Reinforcing digital transmission infrastructure, automating factories and agricultural facilities, integrating real-time data collection and intervention capacities, improving online public services, and building e-commerce networks all have the power to rapidly increase the economic efficiency of farms, businesses (across a very wide spectrum of sectors), and governments. For this to happen, an effective digital transformation strategy needs to be implemented, and should consist of three main components: 1) building a reliable and powerful digital infrastructure; 2) improving all levels of education and technical training programs; and 3) developing programs designed to effectively disseminate applied knowledge throughout the economy. Most of these strategies must be conceived of at the mezzo level, using appropriate sector financing instruments to allow for radical coordinated change.

2.2.2 Problems and Opportunities

Many Caribbean countries are not performing well on many basic levels of the digital economy. Varying regulatory environments and market development trajectories have resulted in

differing market outcomes throughout the Caribbean. Cybersecurity and the use of digital platforms—public and private—are still emerging in most of the region's countries. Digital literacy and professional skills development remain low, and digital entrepreneurship has progressed less than in comparable countries.[6]

In recent decades, investment in digital infrastructure has risen faster than in any other area. Three main issues must be considered when assessing the opportunities such infrastructure projects offer: first, ensuring the overall levels and composition of their capital investment keep up with population growth; second, properly measuring the project's potential state of wear and tear, especially since most depreciation schedules are related to physical infrastructure, as is the case with roads and bridges; and third, correctly projecting their effect on the economy. This last point implies a disaggregated understanding of the project's productivity benefits in various, more or less technology-intensive industries.

In terms of network infrastructure in the Caribbean, Digicel Group and Liberty Latin America (Flow) are currently the main providers of telecommunication services. Consequently, they possess local business units throughout the region, as well as fixed-line and mobile infrastructure assets. Competition between them has encouraged investments, which has resulted in extended fibre and LTE networks while also increasing interest in 5G infrastructure. Although not a material constraint, pre-pandemic conspiracy theories and security considerations have hampered the deployment of this technology in many areas. COVID-19 has essentially stopped the inflow of international tourists and slowed down international trade in many sectors. This has negatively impacted telecom services consumer spending, particularly when combined with increased recourse to IP telecommunication, which is notoriously less expensive.

More generally, COVID-19 has prompted the entire world to take a closer look at the kind of connectivity and high-speed Internet reaching residential areas, especially in developing economies like the Caribbean. Quality broadband services have become vital in a new setting where physical distancing must be respected. As a result, any new capital investment must include sufficient financial provisions for shielding infrastructure against exposure to extreme weather events.

One sizeable opportunity for digital transformation in the Caribbean has been created by the low level of automation and digital management of most farms and manufacturers. The market size is considerable for potential digital improvement of operations, management, and communications of firms operating in all sectors of the economy. According to Compete Caribbean, it is estimated that innovative firms made up a quarter of all businesses, while 59% were "potential innovators", and 15% were non-innovators.[7] Among innovators, 27% expressed that technical uncertainties were an important barrier to their growth, 31% were concerned about the level of information relative to new market trends, and 39% wanted to know more about the flexibility or openness of laboratories/research centers for collaborative approaches. Preliminary results of the recent Innovation, Firm Performance, and Gender Survey (IFPG) survey point to an increase in innovation, even if the overall level of innovation remains low. For these firms, digitally transforming their manufacturing, service and agricultural operations also

[6] http://documents1.worldbank.org/curated/en/848701593136915061/pdf/Dominica-Grenada-St-Lucia-St-Vincent-and-the-Grenadines-and-the-Organization-of-Eastern-Caribbean-States-Caribbean-Digital-Transformation-Project-Digital-Caribbean.pdf.

[7] https://www.competecaribbean.org/wp-content/uploads/2020/05/Exploring-Firm-Level-Innovation-and-Productivity-in-Developing-Countries-The-Perspective-of-Caribbean-Small-States.pdf.

implies obtaining new equipment and disposing of used machinery, tools, and other productive assets, as well as acquiring new hard skills, all of which must be efficiently planned out and executed.

In terms of learning opportunities, as digital technologies improve in capabilities as well as in application diversity and user friendliness, so will the ease with which they can be adopted by all. While early computers required programming skills to operate, most pre-school children and elderly people can now navigate the various functionalities of tablets and cell phones with ease. Of course, specialized technical training is also crucial, yet its relative importance is small compared to the innumerable applications used by everyday workers and citizens. In other words, for most of the software and devices that have concrete economic applications, the main challenge they face stems not from their complexity, but rather from effectively transmitting their existence to vast segments of the population via education systems and professional training.

Otherwise, another prevailing weakness pertains to financial services and payment infrastructure. Currently, digital payments are not yet the norm in the Caribbean, which limits online transactions and inhibits financial inclusion. In response to natural disasters or pandemics such as COVID-19, this shortfall inhibits the possibility for wide-scale social payments. The high cost of opening and maintaining bank accounts reinforces the preference for cash transactions, which limits interaction with the formal banking system. Few merchants accept electronic payments at point of sale and those that do, charge high fees for the service. Many government payments are still primarily handled through cash or checks, which increases administrative costs and limits the demand for digital financial services. These market difficulties also hinder any attraction of foreign direct investment in this sector.

2.2.3 Current Regulatory and Legal Environment

Above all else, a significant step towards an effective digital transformation of the Caribbean will be to modernize the legal, regulatory, and institutional frameworks of the region's telecommunications sector. At present, such reforms should aim to address market failures, promote consumer interests and digital inclusion, and keep pace with the rapid evolution of technology. On a broad level, governments and local institutions support greater competition in telecommunications. In some cases, however, small markets, risk considerations, and more generally imperfect competition may produce preferable economic outcomes, with single supplier/quasi-monopolistic market structures.

The lack of public services offered online is also a major problem in the current environment. Many Caribbean countries perform poorly on the Online Services Sub-Index (OSI) of the UN E-Government Development Index (UN EGDI), which ranks the level of development of digital government services and government portals. This is due to insufficient financing and capacity of agencies responsible for digital transformation. Scale is lacking to justify the high costs of investment in new systems and human resources, and regional collaboration is inadequate to set common standards, as well as to pool scarce resources and hard skills deficits.

In addition, the implementation of modern regulation and legal frameworks on data privacy and sharing will also be a significant task, for personal data constitutes a cornerstone of the digital economy. The nature, use, and control of personal data is an active and

fundamental social debate all over the world, to which the Caribbean must also participate and contribute.

Another main regulatory and policy challenge lies in financial services. Improving policy, legal, and regulatory frameworks will provide structure and reinforce banking and payment infrastructure and services. This in turn will then facilitate their integration and expansion throughout the region's businesses. Also, information security, data protection, as well as privacy laws and regulations must be developed to better protect the public and private sectors from virtual and physical cyberthreats.

2.2.4 Avenues to Facilitate Success

The continued development of a dynamic, inclusive, and safe digital economy in the Caribbean will require a comprehensive approach, one which aims towards best-in-class outcomes, yet accounts for the current situation, to ensure realistic planning and expectations. On this subject, perhaps the most encouraging element is the vast adoption of mobile phones, which can serve as a population-wide tool to deploy new technologies and applications.

Also, it is important to focus this development on the private sector. Certainly, the increased availability of online public services, "smart management" of cities, and modernized digital regulation are worthy endeavours. However, most of the efforts should be geared towards further adopting, using, and developing digital technologies within the private sector, considering the potential benefits they have on productivity and wealth creation as well as on the ensuing positive consequences for the entire population.

To this purpose, the Inter-American Development Bank (IDB) has proposed a six-part agenda, which will address digital transformation challenges in Latin American and Caribbean countries, including how to improve understanding of the digital economy and its impact across the region. It will engage governments and the private sector in projects that maximize the possibilities of the digital economy in all sectors, notably in resolving market failures and exploiting the potential of open digital innovation and platforms in areas such as: scientific research, business innovation, technology commercialization, and talent development, as well as by supporting investments in digital infrastructure and focusing on investments in human capital for the digital economy at all levels. It will also prioritize support for entrepreneurship in the area of digital technology and digital ecosystems development, particularly at the local, city level.[8]

Two comments on this promising menu. First, once the proper infrastructure is in place, the focus will be on training and education. Indeed, one of the main benefits of digital technologies is their scalability, and to reach their full potential, individuals of all sectors and socioeconomic status need to understand their characteristics, functions, and usefulness. Also, it represents a great opportunity to partner with world leaders in their respective fields, from Canada, the United States, and the United Kingdom, who have already implemented large-scale transformations of this sort in high-income economies.

[8] Navarro JC, The Digital Transformation Imperative: An IDB science and business innovation agenda for the new industrial revolution, IDB, 2018. Link: https://publications.iadb.org/publications/english/document/The-Digital-Transformation-Imperative-An-IDB-Science-and-Business-Innovation-Agenda-for-the-New-Industrial-Revolution.pdf.

2.3 Re-Imagining Tourism

2.3.1 Background

For decades, global tourism has experienced steady growth, reaching an estimated 1.2 billion international arrivals in 2016. It is expected to rise to 1.8 billion by 2030. Furthermore, arrivals in emerging economy destinations are projected to grow at double the rate of advanced economies. Consequently, global travel expenditures have more than doubled between 2000 and 2016, rising to US$ 1.2 trillion, and accounting now for 7% of total global goods and services exports (United Nations World Tourism Organization (UNWTO) estimates).

Except for Suriname, Guyana, and Trinidad and Tobago, who rely on commodity exports, Caribbean economies rely heavily on international tourism and business services. Depending on the country, travel and tourism represent anywhere between one and three quarters of the gross domestic product (GDP) of these tourism-dependent countries.[9,10]

In recent years, about 6 in 10 international long-stay tourists in the Caribbean originated from the United States, versus about 10% from Canada, and the same proportion from the United Kingdom. The Caribbean tourism industry is currently facing increased competition from other regions, such as Central America, South America, and Asia.[11] Over the last 25 years, long-stay tourism in the Caribbean has grown by 2.5% compared to the global average of 4.5%. Consequently, the Caribbean's share of global long-stay arrivals fell from 1.1% to 0.7%. At the same time, cruise arrivals have more than tripled, increasing up to 14.5 million passengers prior to COVID-19. Unfortunately, cruise passengers spend much less time and money in each location than long-stay tourists, and in effect contribute much less to local economies. Cruise ships also produce significant carbon emissions, further emphasizing the need for more sustainable modes of transportation.

Prior to COVID-19, these growth trends were expected to continue, based notably on the expanding middle class in emerging economies, the growing population of elderly travellers with particular needs, and the coming of age of millennials and their preference for technology-oriented, sustainable-tourism experiences.[12] Of note, serious concerns were raised about maintaining the number of tourists visiting the region's natural sites due to the associated environmental impact. However, the pandemic has halted massive inflows in their tracks, forcing all to rethink tourism-related activities in the Caribbean and elsewhere. On a worldwide level, the primary concerns for tourists from now on will be proper implementation of efficient and lightweight measures able to reasonably guarantee their safety; and, in the event of contamination, availability of adequate healthcare services.

2.3.2 Problems and Opportunities

At present, by far the biggest problem facing Caribbean tourism is the pandemic's economic consequences. Relying on the previous year for comparison, Standard & Poor's expects

[9] Ibanez et al. Tourism and Innovation: Leapfrogging the Caribbean Private Sector, LSE, 2019.
[10] https://www.caribbean-council.org/preparing-caribbean-tourism-for-the-world-of-tomorrow/.
[11] https://www.caribank.org/publications-and-resources/resource-library/thematic-papers/tourism-industry-reform-strategies-enhanced-economic-impact.
[12] https://www.oecd-ilibrary.org/industry-and-services/analysing-megatrends-to-better-shape-the-future-of-tourism_d465eb68-en.

Caribbean tourism to decline by 60%-70% from April to December 2020, going as far as forcing a credit outlook downgrade for many countries in the region.[13]

Aside from the risks incurred from pandemics or natural disasters, another main limitation of Caribbean tourism is the modest array of visitor origins, with 80% of tourists coming from only three countries. A re-imagined touristic sector will need to attract visitors from a much wider ensemble of locations and cultures, and tourists who speak a broader arrary. Of languages. It will also have to address their different needs and desires, and, ideally, send them home wondering when they can return for another trip. Another facet of this change would be to encourage Caribbean residents themselves to visit their neighbour islands.

The sudden shift from "overtourism" to fears of "non-tourism" creates an unprecedented crisis for these economies. A recent report published by the International Labour Organization (ILO) estimated that due to COVID-19, nearly half a million workers in tourism and related industries faced job loss or precarity. While the small island-states of the Caribbean are resilient and accustomed to recovery after dramatic events such as natural disasters, recovery efforts are typically focused on resuming status quo ante activities as soon as possible. In the present case, the required conceptual and concrete remedies for this pandemic's repercussions will require more elaborate and sizeable resilient solutions and strategies.

The long-term impact of pre-COVID-19 tourism did not come without its own set of challenges, notably longstanding environmental issues that could be mitigated and even reversed with proper management. Cruise ships, for instance, have been associated with coral reef damage, water pollution, and waste. Overtourism has contributed to the degradation of several ecological sites due to human interactions with local ecosystems. To meet the demands of mass tourism over the years, airports, hotels, and ports were built, contributing to forest degradation and habitat loss. In this context, the expected future increase in the number of travellers will pose inevitable challenges to heavily—visited sites, further endangering their long-term ecological viability. New pristine sites and adjacent ecosystems are equally at risk of degradation should tourism practices continue along their previous trajectory.

Food security is also a pressing issue in the Caribbean, as local food supply has been insufficient to accommodate the growth of tourism. Many countries import a significant proportion of their food, namely $4.75 billion for CARICOM countries in 2018 (pre-imposition of duties, levies, and taxes). This represents more than 60% of total food consumption in these countries, with half importing more than 80% of this total. The coronavirus pandemic has only exacerbated this issue, as the number of supply chains, particularly those from the United States, were significantly reduced. This new crisis presents itself as an opportunity to rethink the links between agriculture and tourism. According to the 2020 Future Market Insights (FMI) report, the global agritourism market was valued at US$ 662.1 billion for the 2020–2029 period. Developing the agritourism sector in the Caribbean, specifically with initiatives centered on sustainable farming practices and culinary traditions, could attract future travellers in search of more authentic, local experiences. In addition, a stronger agricultural sector can only help in alleviating this dependency on food imports.

[13] https://www.weforum.org/agenda/2020/05/caribbean-tourism-has-been-decimated-by-covid-19-but-the-private-sector-can-cushion-the-blow/.

As COVID-19 is now a continuing reality, rethinking the way the sector operates is paramount: first, to overcome the immediate challenges brought on by the pandemic; second, to restore the international competitiveness and sustainability of tourism in the Caribbean; and third, both need to be done while preparing in advance, to the fullest extent possible, for a new pandemic or natural disaster. As the appeal of mass tourism declines globally, the impact of COVID19 has pushed the Caribbean tourism industry to a critical juncture, one where decisions will define its future viability and success.

2.3.3 Current Regulatory and Legal Environment

The regulatory and legal frameworks of tourism and other related industries serve a dual purpose. First, they must facilitate business and development opportunities for a sector that drives major parts of their economies. Second, they must establish and manage rules and monitoring systems to ensure the sustainability of these activities. Not doing so would lead to uncontrolled or excessive use of touristic assets, including resulting associated environmental pitfalls. COVID-19 has added two more objectives to this work plan: to confidently ensure the continued safety of visitors and local employees, and to provide adequate care for eventual contaminated travellers.

On the business side of the equation, competition between Caribbean island states is inevitable and healthy. However, collaboration on initiatives that increase the overall flow of tourists to the region can provide benefits to all. Such collaboration can constitute an appropriate strategy to leverage the limited resources of regional entities. For example, the Caribbean Tourism Organisation (CTO) supports and coordinates marketing initiatives for the region. Another example is in the field of training, where the Hospitality and Maritime Training Institute in St. Vincent & the Grenadines serves as the hub for employee training in the Eastern Caribbean. Similar approaches could enhance the rapid deployment of information technology initiatives, along with harmonization measures that could reduce the free flow of goods and individuals amongst Caribbean states.

Sustainable tourism policies, which also address the deleterious effects of climate change, have become commonplace in Caribbean national strategies. Adhering to these policies and rebuilding the design of tourist experience in the region will equip the industry with the tools required to meet future demands, as tourists become more conscious of their environmental footprint. In doing so, the sector itself can play a key role in driving the transition to a low-carbon and resource-efficient economy.

For COVID-19 management, which includes best practices worldwide in terms of physical distancing, mask wearing, hand cleaning, spatial delimitations, etc., ideally, testing and tracing must be implemented consistently and systematically in all hotels, restaurants, airports, attractions, and so on. Also, the concept of “travel bubbles”, like those established by major North American sports leagues, could be established (and regulated) as a way, first, to screen out unhealthy tourists through testing and, second, to ensure that the entire trip for those who are healthy takes place in a fully-secure environment.

As in all successful regulation reform, a close collaboration between private and public sectors is most relevant to give the opportunity to the private sector to properly represent its economic realities, and to help public officials validate the projected impact of reform scenarios. The regulatory framework should also support small and medium-sized enterprises (SMEs) and enable both innovation and competitiveness.

2.3.4 Avenues to Facilitate Success

To survive its current and coming challenges, the Caribbean's tourism industry will have to undergo an objective examination of both its unique strengths and its potential risks, as well as a clear strategic vision of its coming priorities.[14],[15]

Several organisations and governments have proposed strategic orientations to develop tourism in a sustainable fashion. Here is the substance of several of these ideas, in no particular order:

- Both CTO and the Caribbean Development Bank (CDB) reform proposals have encouraged greater collaboration among countries. Indeed, the similarities and interdependencies of these countries are such that reforms should be integrated both nationally and regionally into state policies.[16] One area of collaboration could be to standardize customs and immigration policies. This would incentivize tourism across multiple locations and improve transportation between Caribbean states. In other words, intraregional travel should be made hassle-free, as is the case in Schengen-visa countries. Instead of staying in a single island for a defined period, tourists would have the choice to visit several islands for a few days each, thus enhancing their experience and contributing further to these islands' combined economies.
- Changing travel demographics and preferences must be understood and addressed to accommodate an increased reliance on electronic payments and digital currency. An emphasis on financial literacy education will be needed to support citizens in the transition to a more digitized economy. Also, the rising demand for sustainable, eco-friendly tourism centered on authentic, local experiences should not be left unmet.
- Links should be developed between different tourism industries and the agricultural, manufacturing, and services sectors. For instance, funding agritourism initiatives and clusters in the region would provide additional tourist attractions and reduce the dependency on food imports.
- Government and private industry funds may be created to finance capital projects for local individuals planning to participate in the tourism industry.
- Tourism revenues may be used as a tool for furthering economic diversification, notably to finance medical and educational facilities.
- In closing, see below some actionable items from investors and governments:
  - set up robust COVID-19 sanitary measures to rebuild trust amongst tourists;
  - develop new integrated concepts of tourism products, such as tourism geared towards sports (competitive events, training camps, exhibition events, or the like) where participants are screened for COVID-19 prior to their arrival and remain together during their stay, and 'leave their bubble' only after a period during which no COVID-19 symptoms are apparent. Other similar tourist communities may be developed;
  - tourism-centered initiatives in infrastructure implementation (waste removal, telecom development, electronic payment systems, digital development) may be more affordable and generate a positive economic impact.

[14] https://www.caribbean-council.org/preparing-caribbean-tourism-for-the-world-of-tomorrow/.
[15] https://doi.org/10.1080/09669582.2020.1791141.
[16] https://www.caribbean-council.org/tourisms-recovery-holds-key-to-future-caribbean-growth/.

Comprehensive Roadmap Framework

3.1 From Dreams (phase 1) to Deployment (phase 4)

For each of the three targeted domains, a comprehensive roadmap leading to the deployment of moonshot ideas has been broken down into four phases:

- **Phase 1**
  The dreams and a vision
  During five days in October 2020, a PIVOT event was held, gathering dozens of entrepreneurs, experts, and decision makers from the Caribbean. During this virtual event, an exponential number of ideas relating to electric vehicles, digital transformation, and tourism were considered and discussed. These ideas were named "moonshots," which were defined as "radically ambitious ideas." At the end of the event a manifesto outlining nine moonshot ideas for the Caribbean was drawn up (*https://caribbeanpivot.com/iadb-2020-moonshots-final-pitches/*);

- **Phase 2**
  Preparedness
  This is the complex, multiplayer, multistep phase that lays out the groundwork for infrastructure preparation, business environment and support, skills development, and operational steps. This critical step will prepare the economic and policy environment by properly aligning incentives in each of the three domains, and will facilitate seeing the moonshot ideas through to fruition;

- **Phase 3**
  Feedback Revisiting Moonshot
  This phase takes stock of the achievements/findings resulting from Phase 2 and validates, in each of the three domains, the feasibility of initial moonshot ideas accordingly, revisiting and adjusting their development as required;

- **Phase 4**
  Deployment
  During this final phase, fully adjusted moonshot ideas are launched in their prepared environments.

Figure 1 presents this overall roadmap.

FIGURE 1 COMPREHENSIVE ROADMAP FRAMEWORK

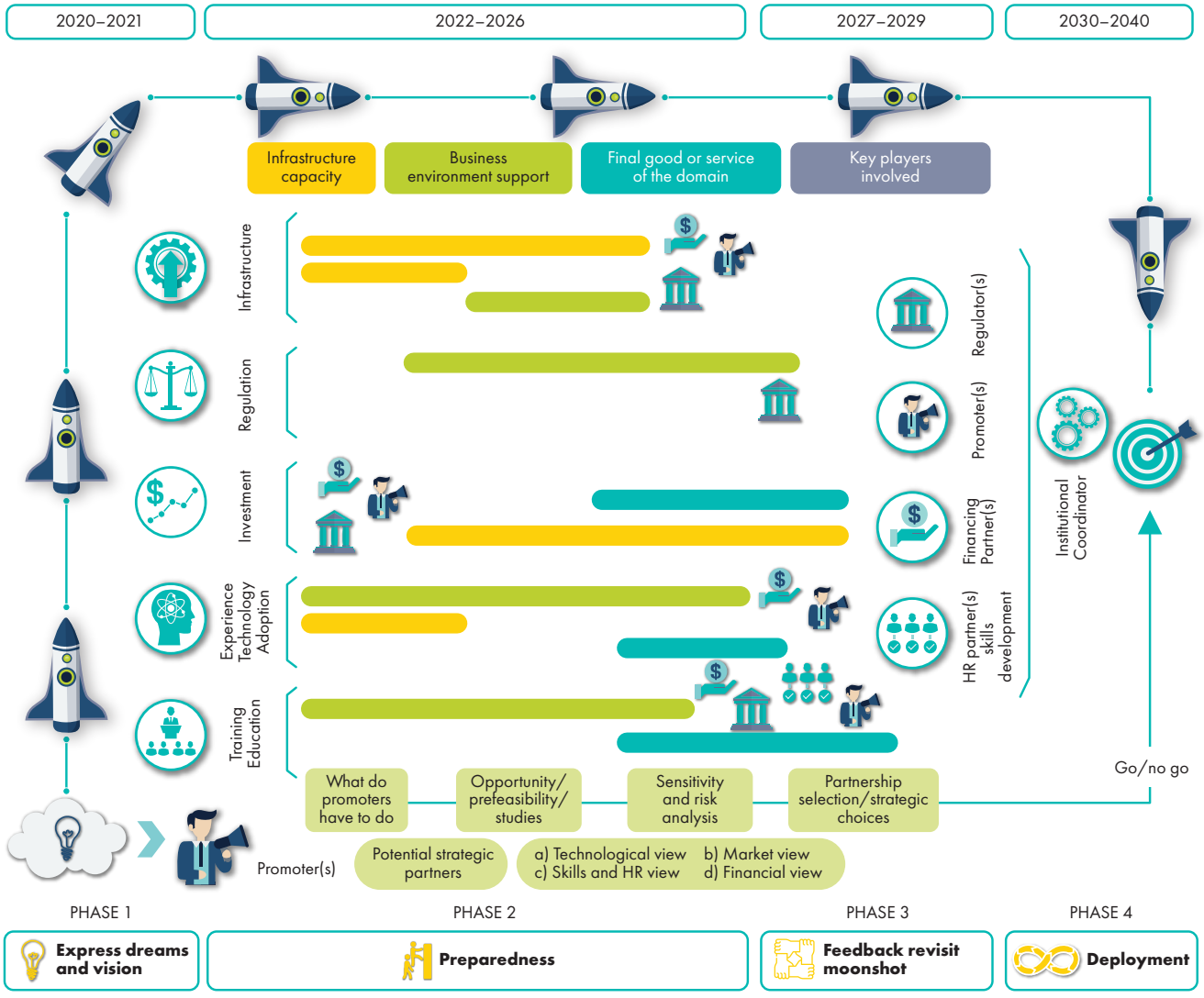
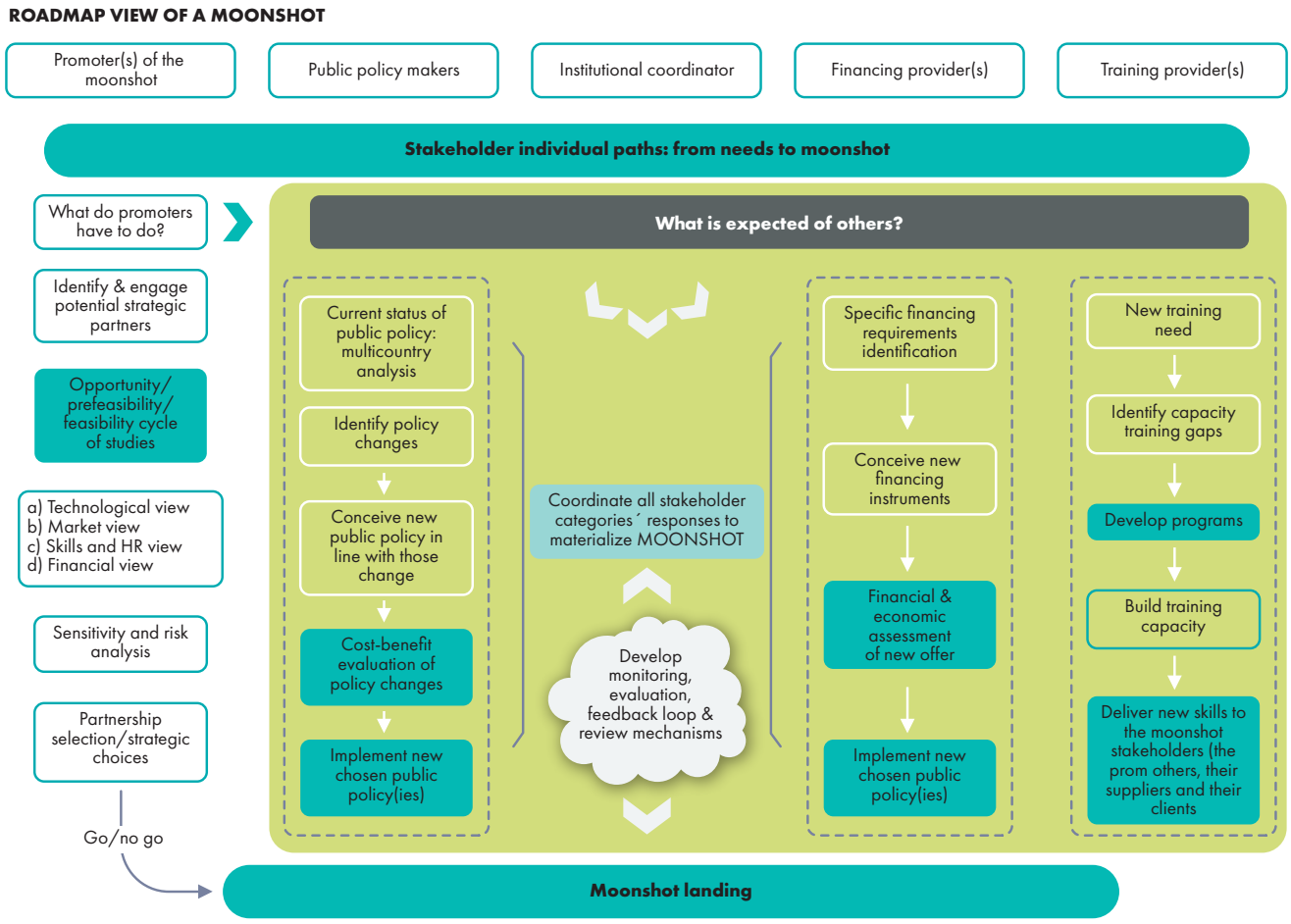


Figure 2 illustrates the individual paths stakeholders must follow to advance each project in a consistent manner, eventually leading to full deployment. Each path consists of a series of steps undertaken to validate the relevance and feasibility of development actions in general, and moonshot ideas in particular. Although these paths are presented sequentially for every type of stakeholder, they will likely interact with each other, formally and informally, further highlighting the complexity and interdependencies inherent in evaluating and implementing domain-specific actions related to their respective moonshots.

FIGURE 2 ROADMAP VIEW OF A MOONSHOT IDEA



In each project, stakeholders can be grouped across domains in the following five categories: "moonshot promoters," public policy makers, institutional coordinators, financing providers, and training providers. Each type of participant in the three targeted domains will be tasked with accomplishing a given set of actions, in effect guiding progress, and alleviating the obstacles encountered, all aiming to complete the vision initially sparked by each moonshot idea. Naturally, during many of these steps, participants will find it necessary to seek the assistance of experts in a variety of fields. These outsourced field specialists will generate reports and deliverables and provide strategic advice.

Participants involved in their respective moonshot ideas will cooperate with each other to develop their project sensibly and efficiently. Also, additional coordination will be required when a project touches several domains simultaneously, e.g., tourism and electric vehicles, or when actions in a given domain impact the achievement of more than one moonshot idea.

3.1.1 Institutional Coordinators

Institutional coordinators are neutral agents, such as the IDB or similar non-governmental agencies (they could also be ad-hoc groups composed of key representatives from other stakeholders—preferably decision-makers who can rely on their respective organizations to maintain and even increase the pace of the development process). These coordinators are located at the center of the roadmap diagram because their dual roles are central to the planning and efficient execution of efforts from all other participants. First, they will interact with all stakeholder categories to facilitate the realisation of moonshot ideas, both within each project and across all those requiring combined efforts and coordinated actions. As such, their presence will be required at each step of the project for each participant to ensure proper execution and planning. Second, they will be responsible for developing and supervising evaluations, feedback loops, and review mechanisms prior to a moonshot "landing" to ensure that goals are reached and, if they are not, to implement corrective measures without delay.

Also, institutional coordinators will have a key say in go/no-go decisions concerning the moonshot idea, in every group of participants.

3.1.2 Promoters of Moonshot Ideas

Moonshot idea promoters may be any type of entity. A private corporation or a group of firms can lead a moonshot project, as well as a government agency, or a not-for-profit organisation, among others. As "owners" of the moonshot's initial idea, promoters will be responsible for bringing it to life. For this to happen, the steps listed here establish the core tasks to be undertaken:

- Describe the nature and the magnitude of the unmet demand, along with supporting data and research.
- Describe in broad strokes how the moonshot idea could be achieved, including relevant quantitative and qualitative elements: project components, size and quantities, geographical distribution, implementation sequence, etc.
- Identify and engage with potential strategic partners that could be instrumental to realising the moonshot idea.
- Conduct opportunity, prefeasibility and feasibility analyses, which seek to answer a number of questions, such as: is the moonshot deployment timeline realistic, and feasible? If so, under what conditions? The various opportunity/feasibility components to validate include:
    - The technical dimensions: does the technology exist? Is it importable, reproducible, or otherwise implementable in the specific (but not limited to) climate and/or geography of Caribbean countries? Will its increased use contribute to fulfilling the unmet demand in satisfactory and significant ways?
    - The market expectations: what are the current and projected supply and demand conditions in the relevant markets targeted by the moonshot idea? (e.g., size, evolution, other buyer/supplier characteristics, industrial organisation and competition, state of co-dependent markets and infrastructure, and demographics.) Do these conditions signal the moonshot idea will be successfully implemented? How will current providers of goods and services react to the presence of the moonshot idea? Should they be approached and, if so, how, and when? Should they be asked to contribute to the project?

  - The financial dimensions: what are the planned cash flow requirements for the moonshot idea in terms of capital investment, future operating revenues, and expenses, and what are the corresponding financing needs?
- Conduct sensitivity analysis and other considerations: all scenarios of financial and economic analyses must include variations and statistical testing to assess the robustness of projected results when faced with significant changes in their initial conditions.
- Select partners and strategic choices, as well as partnership agreements based on analytical results and feedback from initial discussions with the various types of domain participants whose presence is necessary to ensure success.

3.1.3 Public Policy Makers

Similar to the promoter side of the equation, primary government organisations involved in the moonshot idea will be identified, and their respective roles defined as either direct participants or as facilitators via policy, regulation, institutional, or legal reforms required by the project at hand.

For this group, the first step will consist in reviewing existing public policies in the corresponding domains and identifying possible gaps, and ensuing remedial actions: do the current regulatory and legal frameworks allow for the moonshot idea to be implemented? If not, can the necessary reforms be made within a reasonably short timeframe? How and when can these reforms be designed, and implemented? Can this be done in a coordinated fashion across the Caribbean?

Once policy changes have been identified, the next analytical step should be to develop scenarios where previous obstacles preventing the success of moonshot ideas are removed through public policies. A cost-benefit analysis of policy changes should then be conducted, followed by the implementation of the new, chosen policies[17].

3.1.4 Financing Providers

For moonshots to be implemented, financing will be required. Public and private finance providers of these multifaceted and large-scale moonshot ideas could include, among others, local and international banks, government agencies, bilateral or multilateral partners, and venture capitalists. To perform efficiently, they will have to understand the various financing requirements and the timeline of all stakeholders involved. This will require them to design imaginative and coherent financing programs to provide the necessary funds in time for every category of actions required in each domain, at every step of the way.

3.1.5 Training Providers

Human resources will be a core element of all moonshot ideas, from the initial phases to their long-term operation and maintenance. As such, a substantial part of these projects should include the following components: planning long-term human resources needs by types of skills and level of specialization, hiring and onboarding the required basin of workers, providing them with the necessary training to sustain their competency levels, matching their newly acquired

[17] Because moonshot ideas are not intended to benefit only their promoters, but society, an analytical method is required to establish their combined relevance for citizens, firms, and governments. Cost-benefit analyses will be required, so that public resources can be mobilized effectively and efficiently.

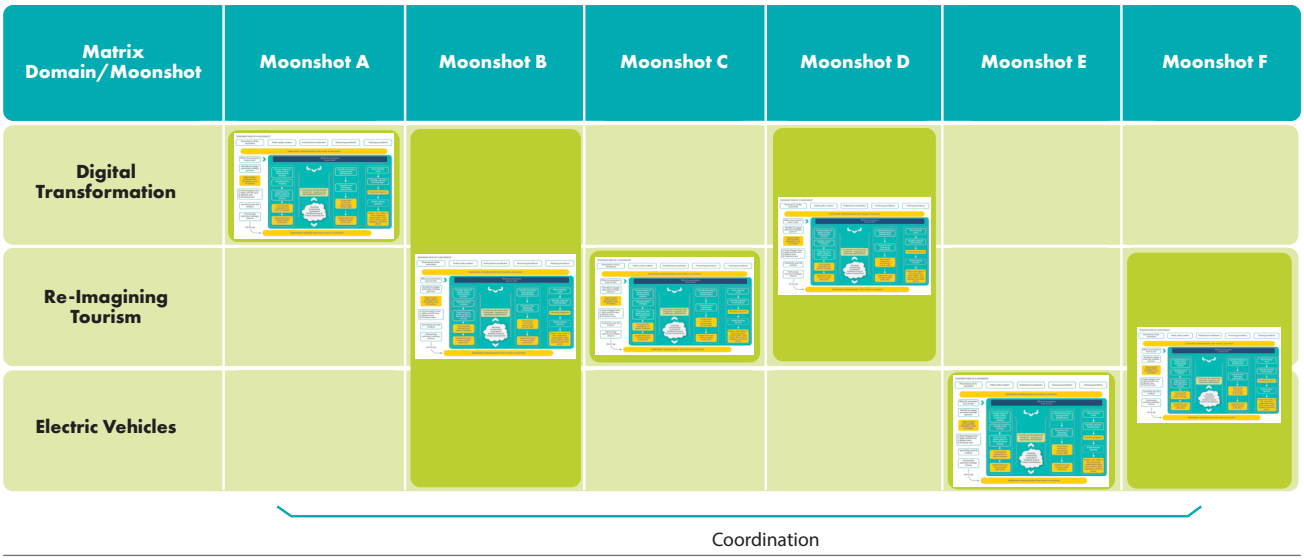
capacities with moonshot idea needs, and updating training capabilities on a continuous basis, notably to keep up with technological progress.

These training and education components (identification of needs and capacities, program development, capacity building, and training per se) should also be implemented in a sustainable way, via established institutions/training providers, or new ones should be founded and supported with durable financing to ensure their long-term viability.

3.1.6 Coordinating Moonshot Ideas

All the domains under review will rely on the roadmaps developed for each moonshot idea. These roadmaps will beget a number of overlaps and/or call upon common "groups of actions." This superposition will require maximum coordination for the implementation to be efficient and avoid duplication. Figure 3 presents several of these overlaps schematically and demonstrates the necessity for coordinating between domains.

FIGURE 3 COORDINATION OF MOONSHOT ROADMAPS



3.2 Overview of Sequential Tasks by Stakeholder Category

Consistent with the overall roadmap structure, Table 1 describes required step-by-step tasks per category of stakeholder, in order to move forward with individual development ideas.

At each step and for each stakeholder, the required tasks, milestones, and approvals must be described, and eventually incorporated into a detailed, step-by-step project-planning timeline. To ensure uniform application across all countries and consistency in business policies and practices, the application of this framework may require regional policy initiatives.

TABLE 1 SEQUENTIAL TASKS BY STAKEHOLDER CATEGORY

Steps	Promoter (private, public, or P-P partnership)	Institutional coordinator	Public policy and regulation	Financing	HR and training
1	Evaluation of unmet demand	Coordination and feedback	Description of current policy status		Identification of HR and training gaps
2	Description of project components	Coordination and feedback	Description of required policy changes	Evaluation of current financial situation	HR and training components of project
3	Identification of strategic partners	Coordination and feedback	Expressions of intentions and potential engagements	Expressions of intentions and potential engagements	Expressions of intentions and potential engagements
4	Pre- and feasibility analyses: technical, markets, financial	Coordination and feedback	CBA of proposed policy changes	Evaluation of financial needs and instruments	Evaluation of HR and training needs and impacts
5	Sensitivity analysis	Coordination and feedback	Sensitivity analysis	Sensitivity analysis	Sensitivity analysis
6	Partner selection	Partner selection	Partner selection	Partner selection	Partner selection
7	Project launch	Project launch	Policy implementation	Financing implementation	HR engagement

3.3 Moonshot Ideas Identified During the PIVOT Event

From October 20 to October 30, the IDB organized a PIVOT event, consisting of five work sessions conducted via teleconference and designed to elicit ideas for breakthrough innovations—moonshots—, that would transform Caribbean economies.

Attendees were divided into three groups, each focusing on a specific development domain and hosted by a facilitator. Each domain was further subdivided into three subgroups, designed for the smaller brainstorming sessions. The three domains of the PIVOT event were:

- Electric Vehicles
- Digital Transformation
- Re-Imagining Tourism

Following these work sessions, nine final moonshot concepts were identified and presented to all summit participants. They were all creative, futuristic, and radically ambitious. The next logical step would be to "land the ideas" and see how to deploy them by 2040.

Each of these three moonshot domains were further separated into three main component categories:

- *Infrastructure/capacity*: moonshot ideas or investments that increase productive capacity or infrastructure in each of the three domains across the Caribbean economies, (e.g., charging network for electric vehicles or building a reliable and powerful digital infrastructure for digital transformation);

- *Utilisation*: moonshot ideas or investments directed to the end user resulting in greater utilisation of electric vehicles, digital technologies, or tourism facilities, thus leading to increased economic growth;
- *Supply/support*: moonshot ideas or investments that provide intermediary goods or services in each domain (e.g., services, materials, equipment, or technologies).

Table 2 identifies how these nine moonshot ideas relate to one or many development domain/project component categories.

TABLE 2 LINK BETWEEN MOONSHOT IDEAS AND DEVELOPMENT-DOMAIN/ PROJECT-COMPONENT CATEGORY

Development domain	Project Component			Brief description of moonshot idea
	Infrastructure / capacity	Utilisation	Environment / support	
Electric Vehicles (note: Hydrogen propelled)				
Sea Wee – large speedboats	✓	✓		A rigid body public transportation vessel capable of traversing the entire island chain in under six hours, from the Bahamas all the way down to the mainland at Guyana.
Flying fish – small hovercrafts	✓	✓		Intended to serve more disconnected communities across the Caribbean, the Flying Fish fleet is an affordable, self-piloting mode of on-demand transport, requested through a mobile app interface.
Fête travail – flying vehicle		✓		Fête Travail is a flight-based mass transportation system that uses direction-shiftable blades, allowing for exceptional maneuverability and incredibly light touchdown. Based on a Lockheed Martin prototype airship from the 2020s, the Fête Travail is so gentle that it can land on a crab without injuring it.
Digital Transformation				
Manager of Integrated Societal Systems in the Caribbean	✓	✓	✓	Envisioned as a panterritorial monitoring service tied to a comprehensive and all-encompassing sensory array that was already being installed across the Caribbean, what started as the Integrated Management System (I.M.S.) was endowed with a cutting-edge Artificial Intelligence capable of parsing, organizing, and processing data faster and more accurately than any team of humans ever could, becoming the Manager of Integrated Societal Systems in the Caribbean (M.I.S.S.C.).
Blurred reality		✓		Using "virtual Caribbean" to model scenarios at any scale allows for the extrapolation of outcomes years in the future as well as an intricate analysis of individuals during a specific moment.
Made in water	✓	✓	✓	Accommodation of environmental conditions by undulating and warping with the underwater currents and the ability to adjust depth by altering internal pressure to facilitate transfer of passengers and cargo just below sea level makes these structures the most versatile constructions in human history.

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TABLE 2 LINK BETWEEN MOONSHOT IDEAS AND DEVELOPMENT-DOMAIN/ PROJECT-COMPONENT CATEGORY *(continued)*

Development domain	Project Component			Brief description of moonshot idea
	Infrastructure / capacity	Utilisation	Environment / support	
Re-Imagining Tourism				
Caribbean Reality		✓		Caribbean Reality is an app designed to preserve, celebrate, and make digitally available the Caribbean experience.
Carbon Offset-Based Lifestyles		✓	✓	Discounts that are subsidized at every level of the tourism industry, from hotel and vendor chains to local produce suppliers down to independent tour guides working a side hustle. Even promoting the program on social media can provide discounts commensurate to a traveler's public profile, improving the tourist trade and reducing its impact on the Caribbean's natural splendor.
Ambassadors of abundance		✓	✓	Living examples of how a philosophy of fulfillment led to a more prosperous and functional culture, with the natural beauty and serenity of the region greatly adding to the effect.

3.4 Applying the Roadmap to the Three Domains under Development

This section describes the structure of the roadmap framework as applied to the three domains in question: electric vehicles, digital transformation, and re-imagining tourism.

Prior to starting the process of initiating moonshot ideas, Caribbean countries need to build the economic foundation on which they could be developed and thrive. To this aim, the next three tables list a series of development actions that would serve to this end. Together they form the initial steps of the "roadmap to development in the three domains under study." Included are the identified list of actions and, for each one, a short description and realistic implementation sequencing. The reasoning behind the sequencing for each group of actions are:

- *Electric Vehicles*: one cannot use (and will not purchase) any type of EV without a clear and reliable plan for recharging, or any other form of clean energy provision. Therefore, actions related to infrastructure should be the first ones initiated and be implemented quickly and at scale. Concurrently, regulatory aspects related to the purchase, use, and end of life of EVs should also be studied, modernised, and/or developed, as needed. Then, once these two main groups of groundwork actions are well underway, incentives to adopt EVs may be implemented; and maintenance, upgrade, and repair services for both EVs and their energy networks can also now be provided, along with offering the proper training and education in order to staff these businesses.
- *Digital Transformation*: digital technologies are already used widely in the Caribbean, albeit via suboptimal infrastructure and in the context of outdated regulations. They are also underused because of insufficient training and imperfect platforms and cybersecurity. In

this context, where all aspects of digital transformation must be addressed, initial priorities should aim to deal with regulation so as to safeguard and harmonize standards and practices throughout the region, and infrastructure, which needs both reinforcement and additional capacity. Then, training and education should follow relatively closely afterwards. Finally, this improved environment will constitute a strong base upon which additional online services and greater technology use can be added.

- *Re-Imagining tourism*: the first and most urgent task is implementing actions and processes to rebuild the trust of tourists worldwide. This includes the critical redesign of a new form of sustainable/socially-integrated tourism. The Caribbean region must be able to benefit from a proactive head start in the soon-to-arrive post-pandemic era. Addressing infrastructure requirements and adapting the local set of skills to the new reality will allow for increased productivity in this key sector of the regional economies.

As a rule, the key conditions to properly implement these development actions are their affordability; their systematic planning, in a step-by-step fashion; and a gradual and realistically scheduled deployment.

The roadmap framework presented in the next three tables covers actionable priority areas in the three domains for the next five years. To ensure its timeliness and accuracy, the framework should be revisited during every PIVOT Event to validate the path toward realizing our moonshots ideas.

Roadmap to Implementation of Moonshot Ideas – Enhancing Resilience and Absorption of Technology in the Caribbean through Stakeholder Engagement and Financing Mobilization

TABLE 3.A DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – ELECTRIC VEHICLES

Electric Vehicles

Sequencing rationale: one can't use (and won't purchase) any type of EV without a clear and reliable plan for recharging, or any other form of clean energy provision. Therefore, actions related to infrastructure should be the first ones initiated, and be implemented quickly and at scale. At the same time, regulatory aspects related to the purchase, use, and end of life of EVs should also be studied, modernised, and/or developed, as needed. Then, once these two main groups of groundwork actions are well underway, incentives to adopt EVs may be implemented; and maintenance, upgrade and repair services for both EVs and their energy networks can be provided, along with the proper training and education to staff these businesses.

Action Theme: Infrastructure and Clean Energy		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
1. Expand portfolio of renewable energy projects, including smart grid systems and energy storage systems (ESS)	Clean energy is required for wide-scale adoption of EVs to make sense from a GHG-emissions standpoint. The implementation of energy generation projects must be done in parallel with that of ESS.												
2. Implement a wide, affordable, and efficient recharging network	The development of a charging network should start with "low-hanging fruits", i.e., stations in densely-populated areas and places, then be extended rapidly to parking spaces in residential areas, notably new developments.												
3. Provide efficient technology options for EVs	Many technologies can contribute to leading the transition towards zero-emission energy. For example, to incentivize the private sector to invest in green hydrogen technology, a study of its potential and development potential in the region should be performed.												
Action Theme: Regulation		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
4. Review and modernise regulation and action plans pertaining to EVs – regional	Regulations on the purchase, use, and end-of-life of automobiles, trucks, and other non-car EVs should be either reviewed and modernised, or created. This includes setting clear and challenging targets, and committing to reach them.												
5. Review and modernise regulation pertaining to EVs – country specific	As possible, reforms should be implemented on a regional scale to benefit from scale economies and facilitate adoption. For instance, harmonization of standards and interoperability of charging systems must be addressed from a multicountry perspective.												

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TABLE 3.A DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – ELECTRIC VEHICLES *(continued)*

Action Theme: Regulation *(continued)*		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
6. Create an Energy Transition Commission for the region	This new organism would intervene and promote all aspects related to clean, renewable, and zero-carbon-emission energy. It could provide novel financing to clean energy and energy efficiency projects.												
Action Theme: EV Adoption		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
7. Incentivize the import and, as possible, production of EVs in the Caribbean	First, the overall goal would be to incentivize switching to electric vehicles, both financially and through public information campaigns, regardless of their origin. Such incentives should be driven by evidence on emissions throughout the complete life-cycle of vehicles. The feasibility of production capabilities in the Caribbean could also be explored.												Moonshots
8. Support the adoption of non-car electric vehicles	The environmental and economic net benefits of zero-emission EVs also apply to non-car vehicles, and should be promoted with proper programs and incentives. For instance, a pilot project could implement small scooter network.												Moonshots
9. Develop ambitious public transport projects	Such large-scale and visible projects are bound to lead by example and raise awareness throughout the region. The PIVOT summit showed that the appeal for such publicly-visible initiatives is high.												Moonshots
10. Develop goods and services to support electric vehicle fleets and charging stations	All manufactured objects are bound to age, including EVs. Spare parts, charging stations and components, and maintenance and repair shops will be needed to support EV fleets.												
Action Theme: Training and Education		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
11. Education and training – Workforce	Education and training programs across all disciplines related to internal combustion engine vehicles (engineering, technical occupations, electromechanics, etc.) should be developed, ideally from a regional perspective.												

Roadmap to Implementation of Moonshot Ideas – Enhancing Resilience and Absorption of Technology in the Caribbean through Stakeholder Engagement and Financing Mobilization

TABLE 3.B DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – DIGITAL TRANSFORMATION

Digital Transformation

Sequencing rationale: digital technologies are already used widely in the Caribbean, albeit via suboptimal infrastructure and in the context of outdated regulations. Also, they are underused, as a result of insufficient training and imperfect platforms and cybersecurity. In this context where all aspects of digital transformation must be addressed, initial priorities should go towards regulation, to safeguard and harmonize standards and practices throughout the Region, and infrastructure, which needs both reinforcement and additional capacity. Then, training and education should follow relatively closely. Finally, this improved environment will constitute a strong basis on which additional online services and greater technology use can be based.

Action Theme: Infrastructure		Sequencing (1 column = 1/2 year)										
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
1. Invest in reliable and powerful digital infrastructure across the entire region	In doing so, promoters have to ensure that: (a) levels and composition of capital investments are aligned with population growth; (b) states of wear and tear are properly measured, especially considering differences between physical and digital infrastructure; and (c) their effect on the economy is projected accurately.												Moonshot
2. Strenghten financial services and payment infrastructure	Digital payments are not yet the norm in the Caribbean, which limits online transactions, inhibits financial inclusion, and, during a disaster, limits the possibility of wide-scale social payments. The preference for cash transactions remains, which limits interaction with the formal banking system. This limits the attractiveness of the region for foreign direct investment.												
3. Safeguard infrastructure against weather events and natural disasters	The Caribbean islands being prone to such adverse natural events, safeguarding its digital infrastructure is essential to maintain communication and intervention capabilities at all times, both within the region and outside of it. This should start immediately, without waiting for newer projects to be developed and inaugurated, and extended to all new projects.												

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TABLE 3.B DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – DIGITAL TRANSFORMATION *(continued)*

Action Theme: Regulation		Sequencing (1 column = 1/2 year)											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
4. Review, harmonize, and modernize legal, regulatory, and institutional frameworks of the telecommunications sector—country specific	As possible, reforms should be implemented on a regional scale to benefit from scale economies and facilitate adoption. For instance, harmonization of standards and interoperability of infrastructure and systems must be addressed from a multicountry perspective.												
5. Review, harmonize and modernize legal, regulatory, and institutional frameworks of the telecommunications sector—regional	Varying regulatory environments and market development trajectories have resulted in differing market outcomes throughout the Caribbean. Such reforms should address market failures, promote consumer interests and digital inclusion, and keep pace with the rapid evolution of technology.												
6. Reinforce cybersecurity and online financial services	Cybersecurity is key to boost and maintain confidence in online financial and governement systems throughout the region. Improving policy, legal, and regulatory frameworks will provide structure and reinforce banking, as well as payment infrastructure and services.												
Action Theme: Technology Adoption		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
7. Automate and increase digital management in health care services, factories, and farms	Greater utilization of digital technologies in these sectors probably represents the greatest potential for spurring economic growth.												
8. Improve online government services	Many Caribbean countries perform poorly on the Online Services Sub-Index (OSI) of the UN E-Government Development Index (UN EGDI), which ranks the level of development of digital government services and government portals. Many government payments are still primarily handled through cash or checks, which increases administrative costs and limits the demand for digital financial services.												

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TABLE 3.B DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – DIGITAL TRANSFORMATION *(continued)*

Action Theme: Technology Adoption *(continued)*		**Sequencing (1 column = 1/2 year)**										
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
9. Incentivize the supply of digital services, materials, equipment, and technologies	While most cutting-edge technology manufacturers are located abroad, their products must be easily accessible for Caribbean populations if they are to be used on a wide scale.												Moonshot
Action Theme: Training and Education		**Sequencing (1 column = 1/2 year)**										
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
10. Improve education and training programs, and knowledge dissemination	While specialized technical training is important, its relative importance is small compared to the innumerable applications used by everyday workers and citizens. For most of the software and devices that have concrete economic applications, the main challenge stems from effectively transmitting their existence and usefulness to vast segments of the population via education systems and professional training.												
11. Consider adopting novel educational models, such as coding bootcamps or deep-learning programmes	Such approaches represent alternative educational pathways addressing the challenges of the digital revolution. For instance, evidence shows that bootcamp graduates are eagerly welcomed by companies around the world who need programming skills and dexterity for artificial intelligence (AI) and data analysis applications.												
12. Support entrepreneurship in digital technology and ecosystems	These innovators may be particularly beneficial at the local, and city level.												Moonshot

Roadmap to Implementation of Moonshot Ideas – Enhancing Resilience and Absorption of Technology in the Caribbean through Stakeholder Engagement and Financing Mobilization

TABLE 3.C DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – RE-IMAGINING TOURISM

Re-Imagining Tourism

Sequencing rationale: the first and most urgent item is to implement actions and processes to rebuild the trust of tourists worldwide, so as to welcome them back as soon as sanitary guidelines permit. Once these measures are in place, tested and judged appropriate, long-haul projects aiming to build infrastructure, increase productive capacity and strengthen resilience should follow, the earlier the better. The rest of projects could then be initiated, either at the same time or soon thereafter.

Action Theme: Investment		Sequencing (1 column = 1/2 year)											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
1. Invest in resilient and sustainable tourism-centered infrastructure	Visitors choose destinations for their attractions, but also for their commodities. Improving infrastructure in areas like waste management, telecommunications, and electronic payments would contribute positively to improving the commodity half of this equation.												
2. Set up robust pandemic sanitary measures to rebuild tourist trust	The COVID-19 pandemic was particularly damaging to the economies of Caribbean countries, which depend significantly on tourism. All possible measures, protocols, and services that can contribute to regain tourism trust worldwide should be implemented.												
3. Facilitate multi-island tourism	This constitutes a multifaceted project, as investments in transport, border infrastructure and regulation, and other amenities would be required, among others.												
Action Theme: Experience		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
4. Actively manage and monitor changing demographics and preferences	Changing demographics, a greater diversity of origin countries, economic growth, and environmental imperatives are key drivers that are bound to influence tourism demand in coming years. Monitoring this demand and adjusting supply consequently will be key to the sector's evolution in coming years.												Moonshots

(continued on next page)

TABLE 3.C DEVELOPMENT ACTIONS AS ECONOMIC FOUNDATION FOR MOONSHOT IDEAS – RE-IMAGINING TOURISM *(continued)*

Action Theme: Experience *(continued)*		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
5. Develop new integrated tourism concepts geared towards sports, eco- and agritourism, and adventures	Developing and renewing tourism experiences based on the Caribbean's unique characteristics and opportunities are the best way to highlight them and encourage return stays.												Moonshots
6. Develop longer stay experiences, notably for hybrid tourism/teleworking stays	Teleworking opens a whole set of opportunities for longer-duration trips, combining the region's experiences with work and business realities of travellers.												Moonshots
7. Initiate long-term, community exchanges with paired cities or regions	Such exchanges would lower the environmental imprint and generate more social communication. Caribbean residents would be matched with groups of foreign residents who would stay over an extended period. For example, instead of 10,000 tourists each staying 15 days (for a total of 150,000 nights of stay), develop opportunities to target 150 nights (6 months) per person for 1,000 persons.												Moonshots
Action Theme: Training and Education		**Sequencing (1 column = 1/2 year)**											
Designation	**Description**	**Y1-1**	**Y1-2**	**Y2-1**	**Y2-2**	**Y3-1**	**Y3-2**	**Y4-1**	**Y4-2**	**Y5-1**	**Y5-2**	**...**	**Y10-15**
8. Create funds to finance capital projects and entrepreneurship in tourism	To sustain international interest and increase the probability of returning visits, supply diversity and novel experiences offered by new operators, tours, and businesses must be developed continuously.												

Conclusion

This report has outlined a comprehensive roadmap to use in the organization, coordination, and implementation of moonshot ideas that were enunciated over the course of a PIVOT event in October 2020. Three broad domains of the Caribbean economies formed the base from which these moonshot ideas were developed: electric vehicles, digital transformation, and re-imagining tourism. The background and development avenues of each domain are elaborated upon in detail in the second section of the report. A section describing the framework of a comprehensive generic roadmap follows, laying out a coherent long-term plan that will lead to the full deployment of moonshot ideas. Finally, in the last section, this roadmap has been applied to the specific development areas and ideas brought up over the course of the PIVOT event.

The following three figures depict how the roadmap framework should be applied to the three domains in which moonshot ideas were identified, namely electric vehicles, digital transformation, and re-imagining tourism. Of note is the emphasis on activities to implement during the *preparedness phase* of the roadmap, to ensure the full and successful deployment of the moonshot ideas in due course.

FIGURE 3.A ROADMAP FOR IMPLEMENTING MOONSHOT IDEAS – ELECTRIC VEHICLES

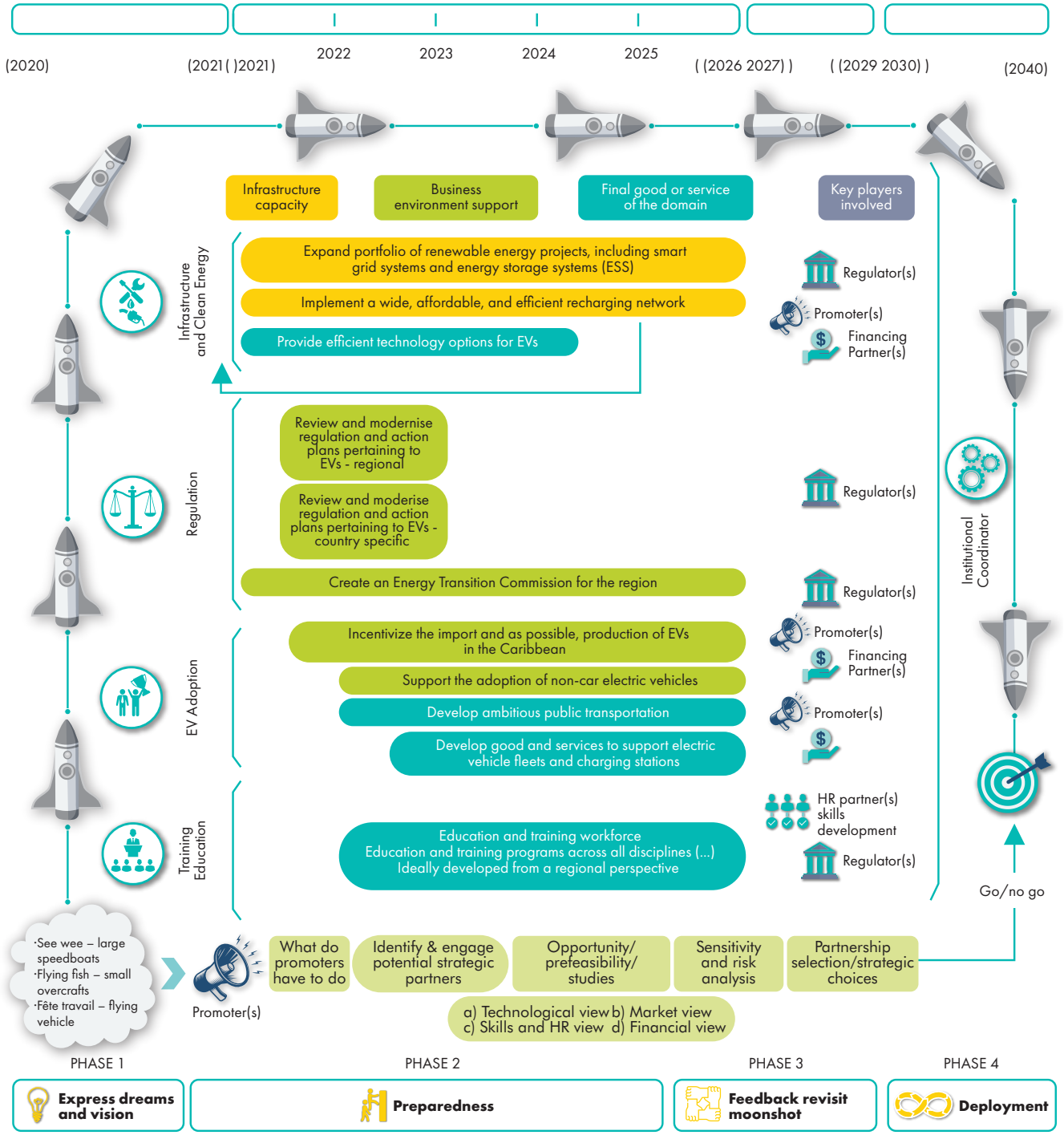


FIGURE 3.B ROADMAP FOR IMPLEMENTING MOONSHOT IDEAS – DIGITAL TRANSFORMATION

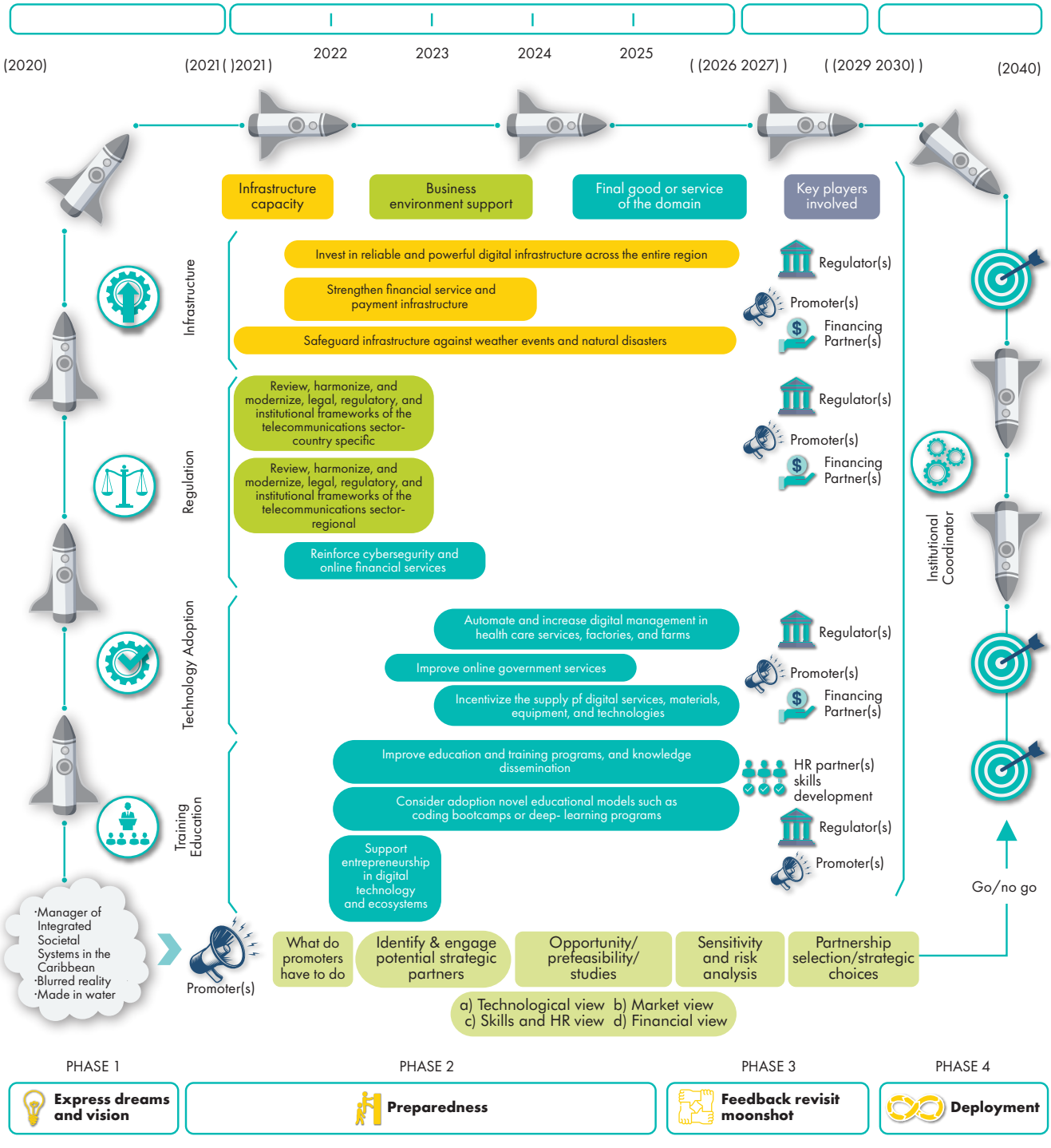
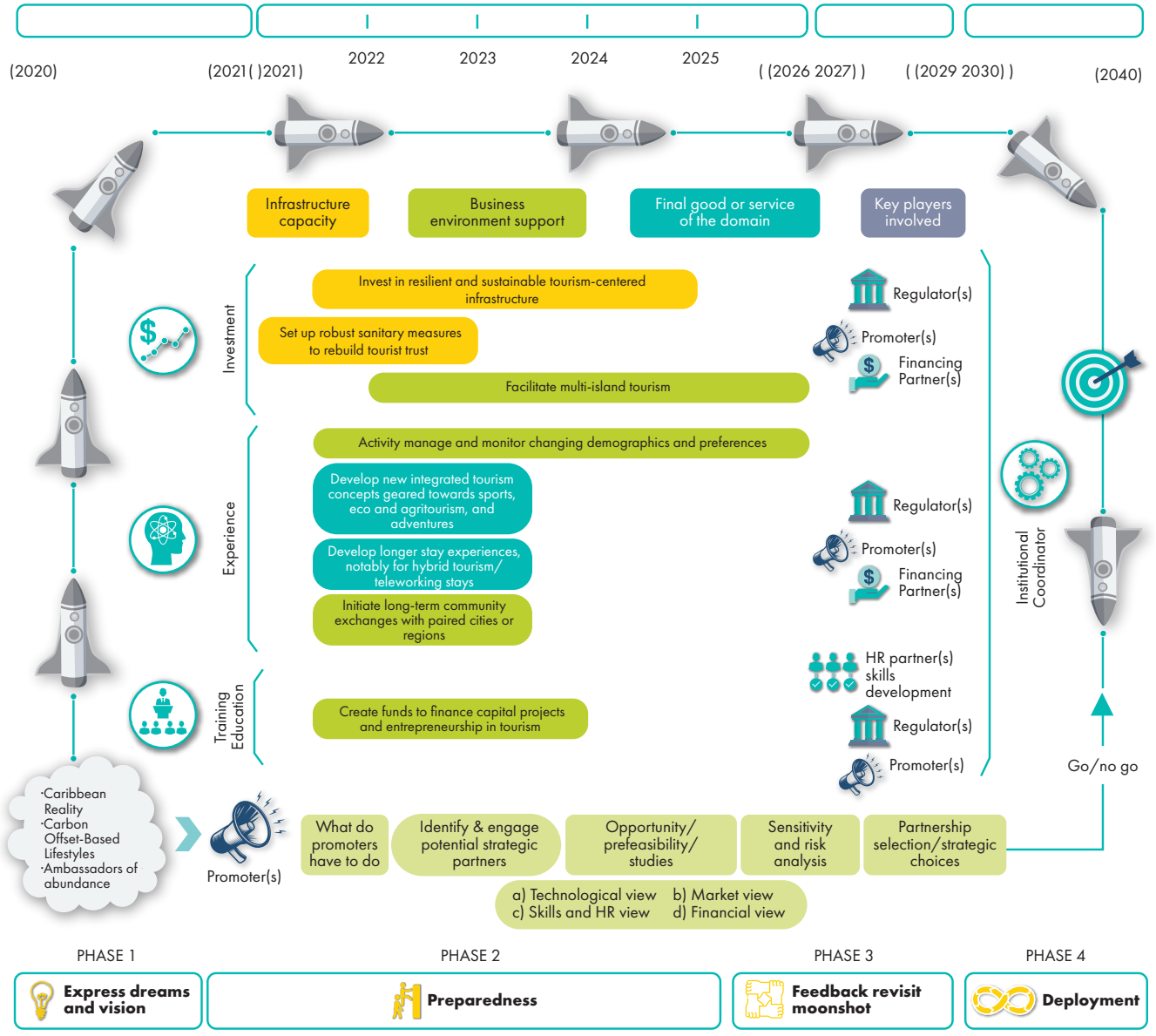


FIGURE 3.C ROADMAP FOR IMPLEMENTING MOONSHOT IDEAS – RE-IMAGINING TOURISM



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PIVOT

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