A RESEARCH, INNOVATION AND KNOWLEDGE MANAGEMENT ROAD MAP FOR THE SOUTH AFRICAN MARITIME SECTOR

CHARTING A COURSE TO

MARITIME EXCELLENCE

BY 2030

SAMSA
SOUTH AFRICAN
MARITIME SAFETY AUTHORITY

SAIMI
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A RESEARCH, INNOVATION AND KNOWLEDGE MANAGEMENT ROAD MAP FOR THE SOUTH AFRICAN MARITIME SECTOR

CHARTING A COURSE TO MARITIME EXCELLENCE* BY 2030

Compiled by: Council for Scientific and Industrial Research in partnership with SAIMI

Compiled for: South African Maritime Safety Authority

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** Maritime excellence means that South Africa is globally recognised as one of the world's 35 maritime nations by 2030.*

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ACRONYMS

ACEP	African Coelacanth Ecosystem Programme
AGRISETA	Agricultural Sector Education and Training
AIMS	Africa's Integrated Maritime Strategy
AIS	Automatic Identification System
AMSSA	African Maritime Safety and Security Agency
ARESSA	Antarctic Research Strategy for South Africa
ATAP	Acoustic Tracking Array Platform
AU	African Union
BANKSETA	Bank Sector Education Training Authority
BBBEE	Broad–based Black Economic Empowerment
BRICS	Brazil, Russia, India, China and South Africa
CATHSSETA	Culture, Arts, Tourism, Hospitality, Sports Sector Education and Training Authority
CCRED	Centre for Competition, Regulation and Economic Development
CEO	Chief Executive Officer
CHIETA	Chemical Industries Education and Training Authority
CHPC	Centre for High Performance Computing
CIWSP	Cooperative Inland Waterways Safety Programme
CPSI	Centre for Public Service Innovation
CPUT	Cape Peninsula University of Technology
CSIR	Council for Scientific and Industrial Research
CWET	Cape Windjammers Education Trust
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DHA	Department of Home Affairs
DHET	Department of Higher Education and Training
DIRCO	Department of International Relations and Cooperation
DMR	Department of Mineral Resources
DPME	Department of Planning, Monitoring and Evaluation
DoE	Department of Energy
DoT	Department of Transport
DRC	Defence Review Committee
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FASSET	Financial and Accounting Sector Education and Training Authority
FEE	Foundation for Environmental Education
FET	Further Education and Training
FOODBEV	Food and Beverages Sector Education and Training Authority
GDP	Gross Domestic Product
GIS	Geographic Information System
HEI	Higher Education Institution
HSRC	Human Sciences Research Council
HWSETA	Health and Welfare Sector Education and Training Authority
ICT	Information and Communications Technology
IDC	Industrial Development Corporation
IMO	International Maritime Organization
INSETA	Insurance Sector Education and Training Authority
IOPC	International Oil Pollution Compensation
IORA	Indian Ocean Rim Association
IP	Intellectual Property
ISETTSETA	Electronics and Telecommunications Technology Sector Education and Training Authority

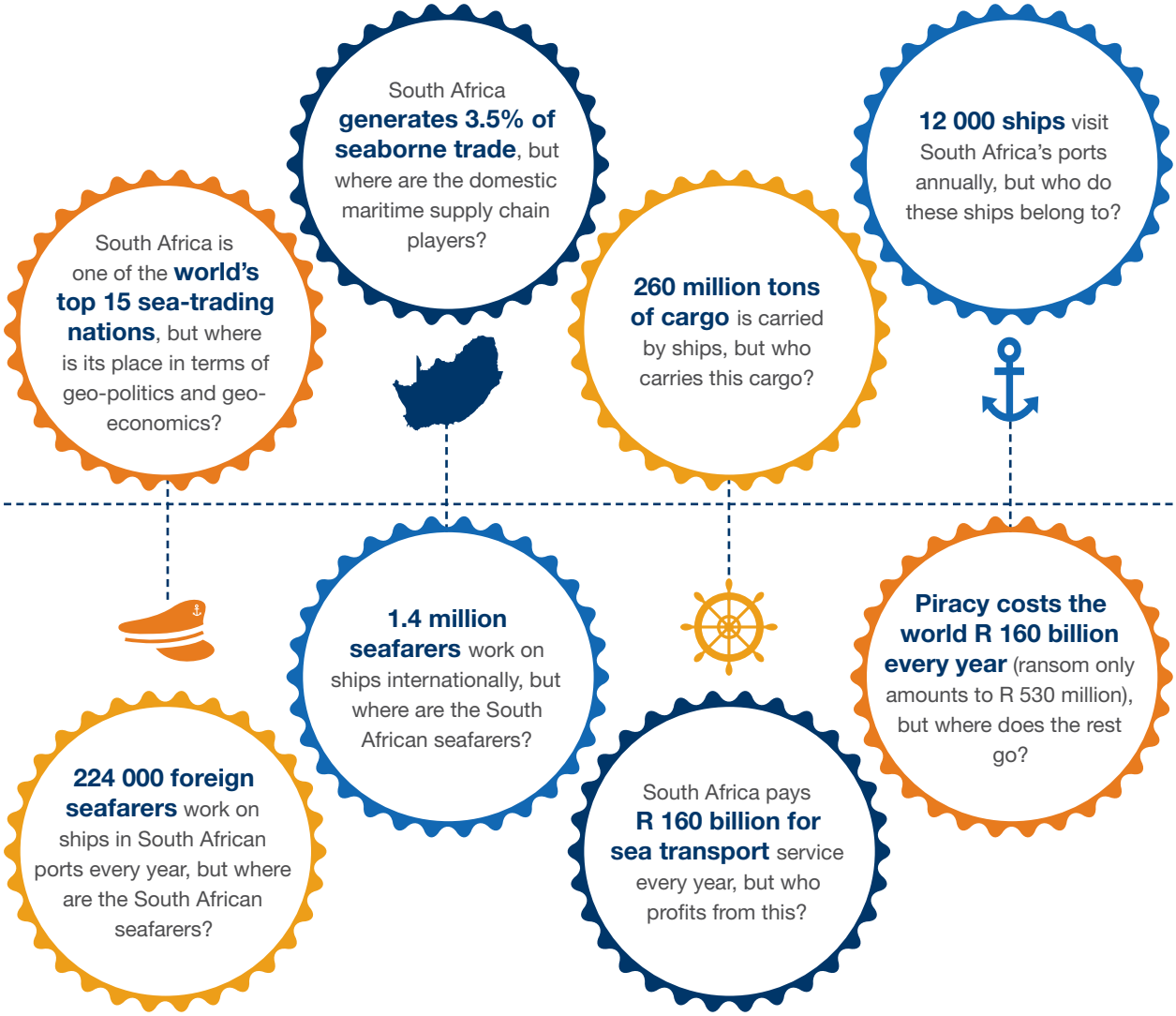
KPI	Key Performance Indicator
LTER	Long Term Ecological Research
MBCC	Mandela Bay Composites Cluster
MCEP	Manufacturing Competitiveness Enhancement Programme
MDA	Maritime Domain Awareness
MERSETA	Manufacturing Engineering and Related Services Sector Education and Training Authority
MPA	Marine Protected Area
MPSG	Marine Protection Services and Governance
MQA	Mining Qualifications Authority
MSP	Marine Spatial Planning
MTEF	Medium Term Expenditure Framework
MTM	Marine Transport and Manufacturing
MTPWG	Maritime Transport Policy Working Group
NDP	National Development Plan
NEOSS	The National Earth Observation and Space Secretariat
NMMU	Nelson Mandela Metropolitan University
NPC	National Planning Commission
NRF	National Research Foundation
NSRI	National Sea Rescue Institute
NSTF	National Science and Technology Forum
NQF	National Qualifications Framework
PASA	Petroleum Agency South Africa
PPP	Public-Private Partnership
R&D	Research and Development
RSA	Republic of South Africa
SABBEX	South African Boatbuilders Export Council
SADC	Southern African Development Community
SAEON	The South African Environmental Observation Network
SAHRA	South African Heritage Resources Agency
SAIMI	South African International Maritime Institute
SAMIC	South African Maritime Industry Conference
SAMSA	South African Maritime Safety Authority
SAMREF	South African Marine Research Exploration Forum
SAN	South African Navy
SANAP	South African National Antarctic Programme
SANDF	South African National Defence Force
SASSETA	Safety and Security Sector Education and Training Authority
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SETA	Sector Education Training and Authority
SETI	Science, Engineering, Technology and Innovation
SMME	Small, Medium and Micro–sized Enterprise
SOLAS	Safety of Life at Sea
TETA	Transport Education and Training Authority
THETASETA	Culture, Sport, Tourism and Hospitality Sector Education and Training Authority
TNPA	Transnet National Ports Authority
TVET	Technical Vocational Education and Training
TU Delft	Delft University of Technology
USA	United States of America
WMU	World Maritime University
W&RSETA	Wholesale and Retail Sector Education and Training Authority

THE PURPOSE OF A MARITIME ROAD MAP

1 THE PURPOSE OF A MARITIME ROAD MAP

South Africa has 3924 kms of coastline and a "sea-land" area that is three times bigger than its land size. Thirty percent of South Africa's population lives on the coast. The country is also positioned on a major shipping route (see Figure 1 on page 6) and has eight commercial ports and 44 non-commercial harbours. Currently, 58% of South Africa's gross domestic product (GDP) is based on trade and 98% of South Africa's trade volume moves by ships. In addition, the country generates a significant 3.5% of the world's seaborne trade volume[1]. However, in spite of these impressive numbers, South Africans generally do not recognise their country as a maritime nation[2,3].

At the Integrated Marine and Maritime Technologies Workshop held at the Farm Inn in Pretoria in October 2013, Commander Mokhele, the chief executive officer (CEO) of the South African Maritime Safety Authority (SAMSA), posed the following interesting and pertinent questions regarding the status quo of South Africa's maritime sector[4]:



1 Mokhele, T. 2013. *Towards an Integrated Maritime Development Framework and Industrialisation Programme for South Africa.* Keynote presentation at the Integrated Marine and Maritime Technologies Workshop, 30 October 2013, Farm Inn, Pretoria.

2 Funke, N., Nortje, K. and Claassen, M. 2014. *SAMSA/DST Research, Innovation and Knowledge Management Maritime Road Map project: Regional Workshop Notes.* CSIR Report Number: CSIR/NRE/WR/MEMO/2014/0004/B. Pretoria: Council for Scientific and Industrial Research.

3 Funke, N., Nortje, K. and Claassen, M. 2016. *Linkages between the Research, Innovation and Knowledge Management Maritime Road Map and Operation Phakisa: Oceans Economy: Regional Workshop Notes.* CSIR Report Number: CSIR/NRE/WR/IR/2016/0048/B. Pretoria: Council for Scientific and Industrial Research.

4 Funke, N. and Claassen, M. 2014a. *Proceedings of the Integrated Marine and Maritime Technologies Workshop*, 30 October 2013, Farm Inn, Pretoria. ISBN Number: 978-0-7988-5615-7. Pretoria: Council for Scientific and Industrial Research.

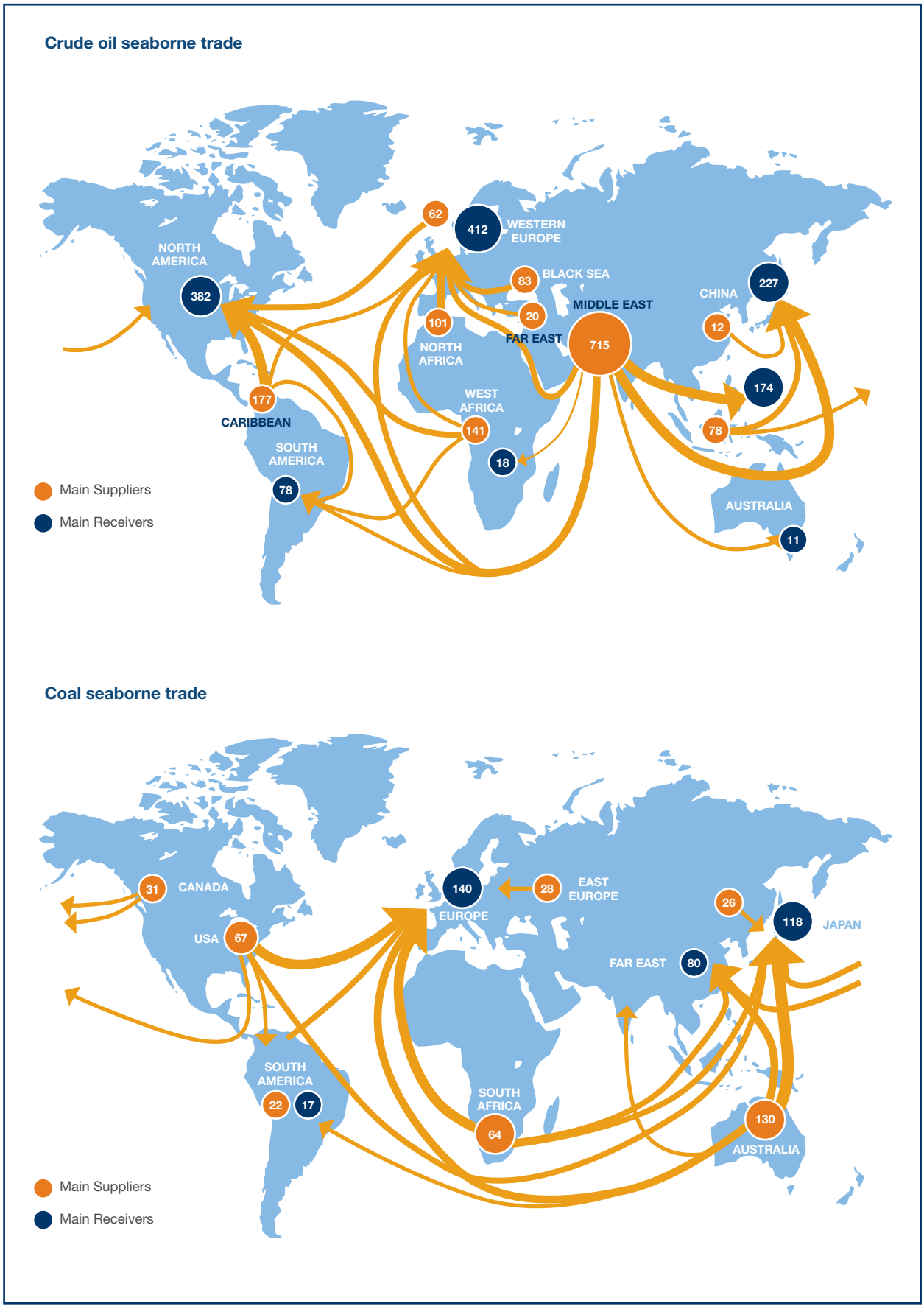


Figure 1: Maps depicting South Africa as a major strategic trade route[4].

In order to provide a mechanism through which these and other critical questions can be answered, SAMSA[5], in collaboration with the Department of Science and Technology (DST) and the South African International Maritime Institute (SAIMI), appointed the Council for Scientific and Industrial Research (CSIR) to facilitate the process of developing a National Research, Innovation and Knowledge Management Road Map for the South African Maritime Sector (hereafter referred to as the Maritime Road Map).

The Maritime Road Map presents a vision for the maritime sector, which is for South Africa to be globally recognised as a maritime nation by 2030. The Maritime Road Map subsequently identifies eight key objectives, which, together with a set of core research, innovation and knowledge management-focused actions per objective, serve to enable the maritime sector to chart a course to maritime excellence in South Africa. The Maritime Road Map therefore sets the agenda for the research, innovation and knowledge management needs for the maritime sector and maps out the direction the maritime sector is required to take in order address these needs.

The Maritime Road Map furthermore serves to support the South African government's Operation Phakisa Oceans Economy process (hereafter referred to as Phakisa: Oceans Economy), which was launched in October 2014. Phakisa: Oceans Economy, which is being coordinated and promoted by the Oceans Economy Secretariat at the Department of Environmental Affairs (DEA), and is being led by the Department of Planning, Monitoring and Evaluation (DPME)'s Operation Phakisa Delivery Unit, focuses on unlocking the economic potential of South Africa's oceans. Through the successful implementation of this initiative, the country's oceans are estimated to be able to contribute up to R 177 billion to the GDP by 2033 (compared to R 54 billion in 2010), and lead to the creation of 22 000 new direct jobs by 2019[6].

Phakisa: Oceans Economy focuses on six priority growth areas: marine transport and manufacturing, offshore oil and gas exploration, aquaculture, marine protection services and ocean governance, small harbours development, and coastal and marine tourism. The Phakisa: Oceans Economy process involved engagement with 656 participants from 68 institutions in government, the private sector, civil society, labour and academia. This engagement process led to the development of 47 detailed initiatives which translate into more than 400 key performance indicators (KPIs) and more than 2900 specific activities[6].

5 The Maritime Road Map was specifically commissioned by SAMSA's Research, Innovation and Knowledge Management Strategic Programme.

6 Share, A., Swift, M. and Zaccheo, S. 2016. *Operation Phakisa: Oceans Economy.* Presentation by members of the Oceans Economy Secretariat at a workshop to discuss linkages between the Maritime Road Map and Phakisa: Oceans Economy. 25 January 2016, CSIR Knowledge Commons, Pretoria.

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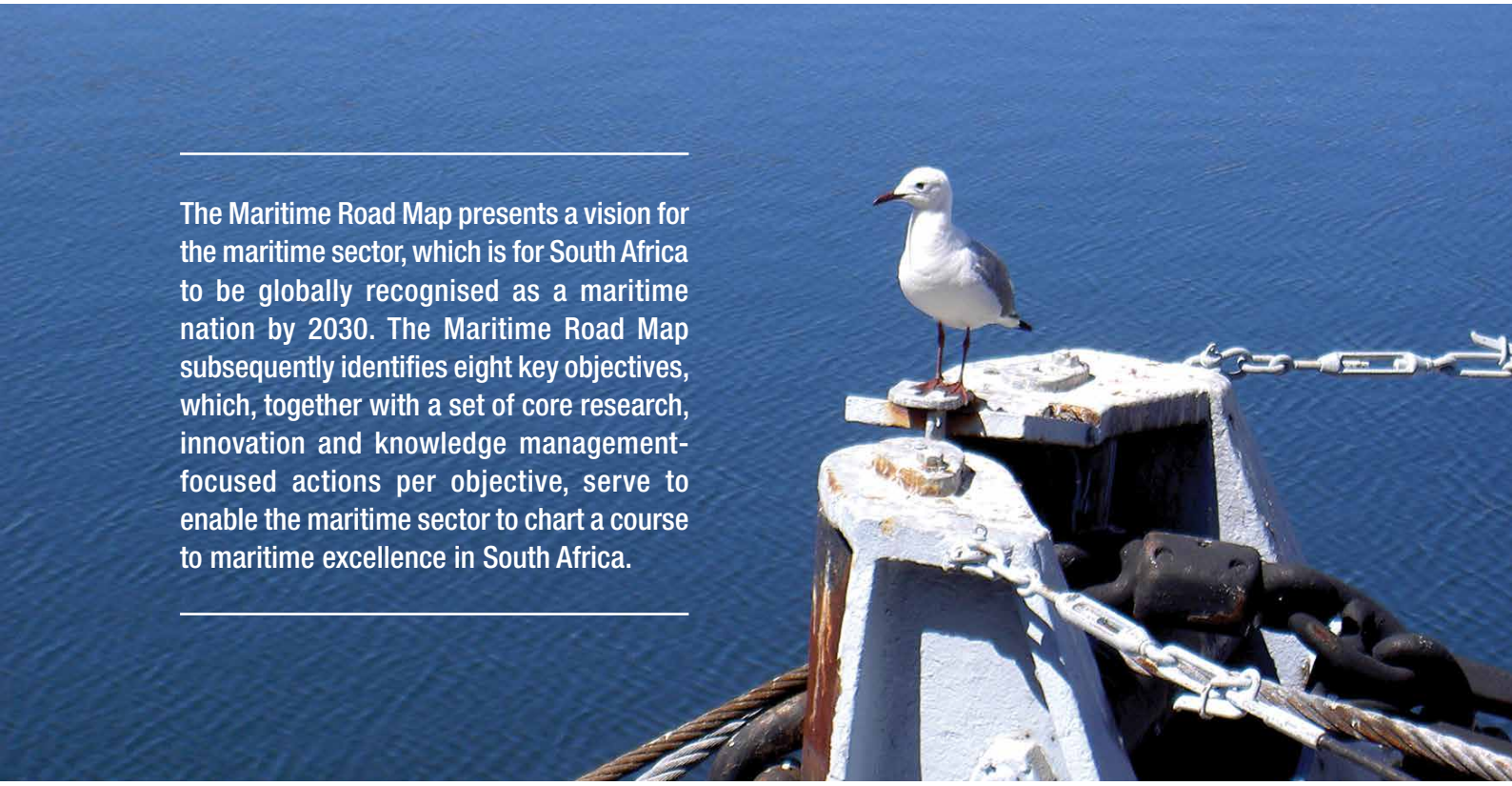
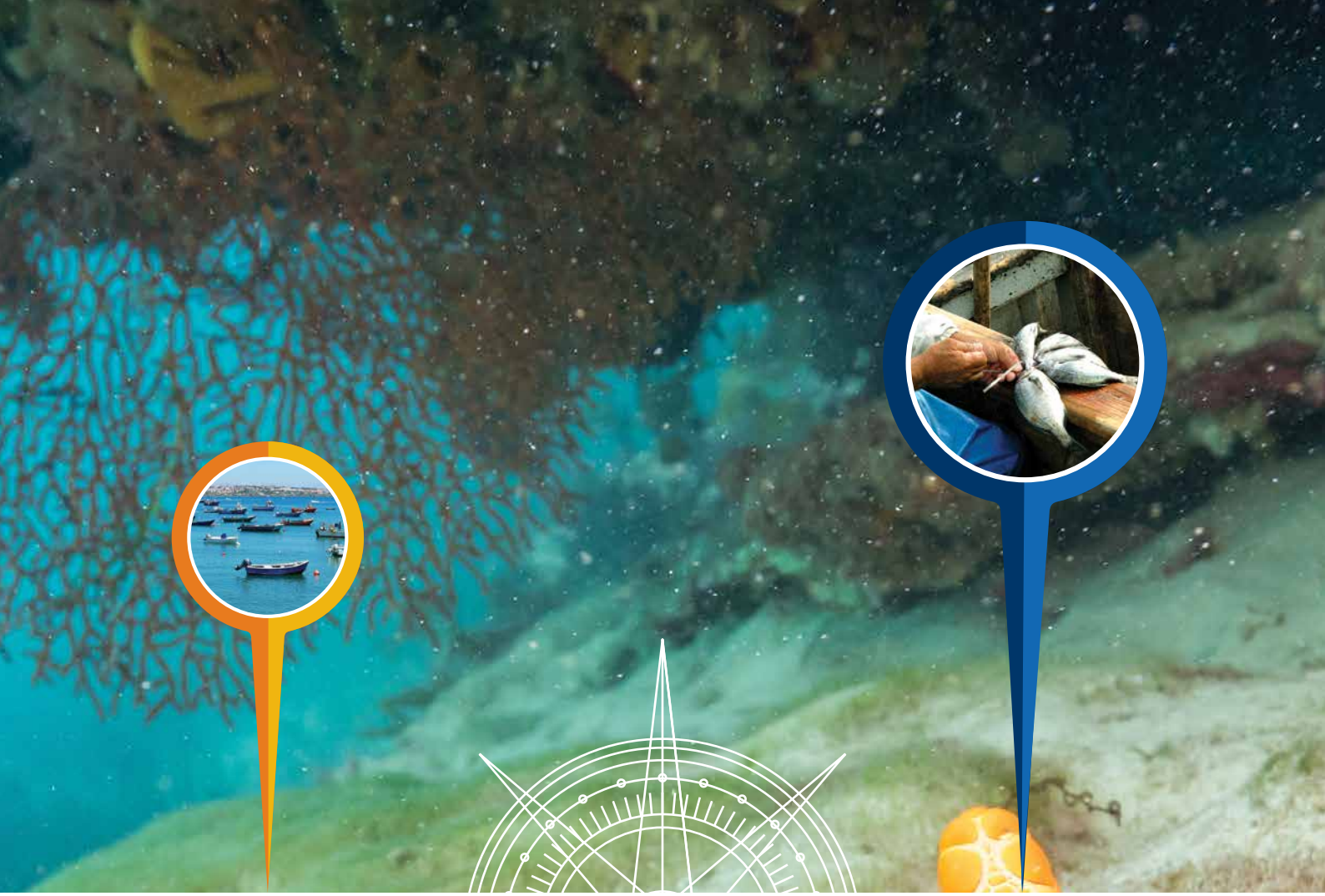


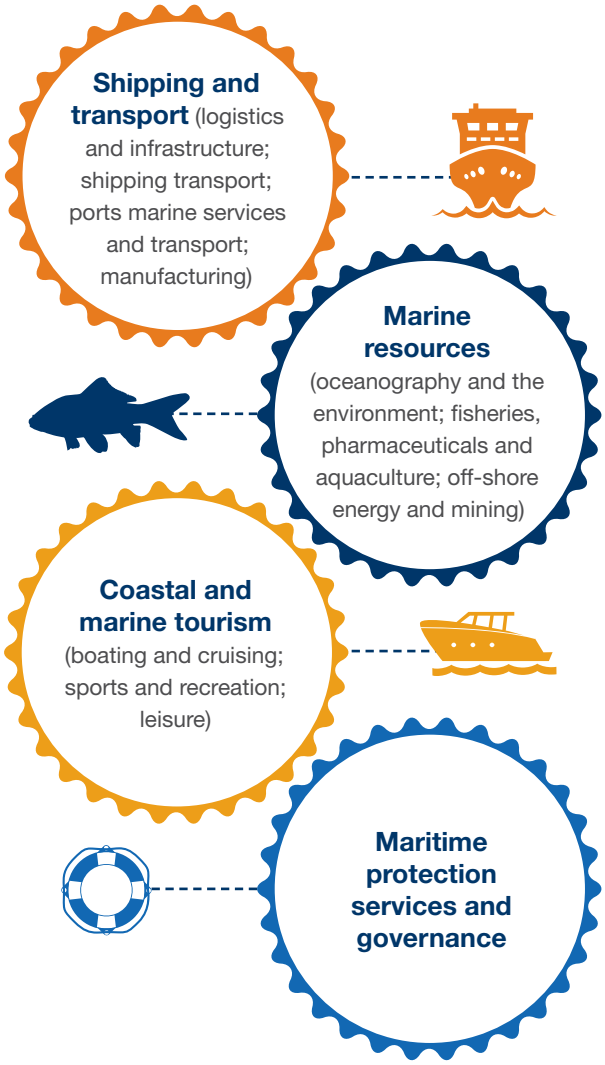


THE SCOPE OF THE ROAD MAP

2 THE SCOPE OF THE ROAD MAP

The scope of the Maritime Road Map covers both the maritime and marine domains. "Maritime" is defined as "connected with the sea, especially in relation to seaborne trade or naval matters", whereas "marine" is defined as "relating to or found in the sea"[7]. Where the word "maritime" is used in this document, it should be read to also include "marine".

The thematic areas that define the scope of the Maritime Road Map are:



Furthermore, the three key elements of the Maritime Road Map are: research, innovation and knowledge management.

Research can be defined as "the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions"[7]. The Maritime Road Map identifies a number of pertinent research questions and opportunities for the maritime sector. Conducting this research and ensuring the effective uptake of the research findings that are produced could make a considerable contribution to steering South Africa to a position of maritime excellence by 2030.

Innovation is "the capacity to generate, acquire and apply knowledge to advance economic and social purposes. It includes the search for frontier technologies driven by research and development (R&D), as well as the forms of learning and adaptation that might be market led or socially driven[8]." The Maritime Road Map identifies a number of innovation needs and opportunities which support the realisation of its various objectives. Taking hold of such needs and opportunities is critical for South Africa to be recognised as a maritime nation that employs cutting edge thinking and innovation to take hold of the opportunities and address the challenges the maritime sector presents.

Knowledge management "is the process of capturing, distributing, and effectively using knowledge"[9]. The Maritime Road Map identifies the needs and opportunities for improved knowledge management as one of the most important requirements for the maritime sector given the absence of a maritime coordinating body. Developments under the Phakisa: Oceans Economy process, such as the establishment of SAIMI may be able to address some of the sector's knowledge management requirements in future.

7 Oxford, 2014. *Oxford Dictionary of English.* Oxford: Oxford University Press.

8 Gevers, W., Kahn, M. and Moore, R. 2012. *Department of Science and Technology Ministerial Review Committee on the Science, Technology and Innovation Landscape in South Africa.* Pretoria: Department of Science and Technology.

9 Davenport, T.H. 1994. Saving IT's Soul: Human-centered Information Management. *Harvard Business Review*, 72(2): 119-131.

THE DEVELOPMENT OF THE MARITIME ROAD MAP

3 THE DEVELOPMENT OF THE MARITIME ROAD MAP

A road map outlines the actions that need to be undertaken over specified time frames to achieve a certain set of stated goals and outcomes for the context in question. The starting point for the development of a road map is to agree on the vision and the mission, as indicated in Figure 2. The vision is aspirational and directs action. The second step in the process is to define the need for a road map and to conduct an assessment. Such an assessment will focus on the plans, systems, processes, capacity, challenges and opportunities that need to be taken into account in the development of the road map. The road map, which features a set of actions, represents the path from the current reality to the desired state to deliver benefits to society in the context of drivers of change.

The Maritime Road Map features a vision and mission. It furthermore identifies a series of eight high-level objectives, each of which characterises and complements the stated vision for the maritime sector. Each of these objectives subsequently translates into a number of actions which collectively map out the road that needs to be followed to get from the current state to the desired state.

The Maritime Road Map was developed through a series of stakeholder consultation and data analysis activities which ran in parallel (Figure 3). The initial scoping phase started with the establishment of a steering committee, a tertiary qualifications study and a review of existing relevant strategies in the sector. This phase was followed by the hosting of the Integrated Marine and Maritime Technologies Workshop, which focused on establishing the present state of research, innovation and knowledge management in the maritime sector.

The vision for the South African maritime sector, a key "ingredient" for road map development, was informed by the Integrated Marine and Maritime Technologies Thought-Leaders Indaba, which was held immediately after the technologies workshop.

Further inputs to the Maritime Road Map were solicited through smaller regional workshops, semi-structured interviews with key stakeholders across the maritime sector and an email survey. A broad range of documents was also reviewed.

Following the launch of Phakisa: Oceans Economy, the project team ran another round of regional workshops and liaised with the Oceans Economy Secretariat to ensure alignment between the Maritime Road Map and the Phakisa: Oceans Economy initiatives. All of the above-mentioned stakeholder inputs together with the literature review were subsequently analysed, clustered and structured to inform the Maritime Road Map.

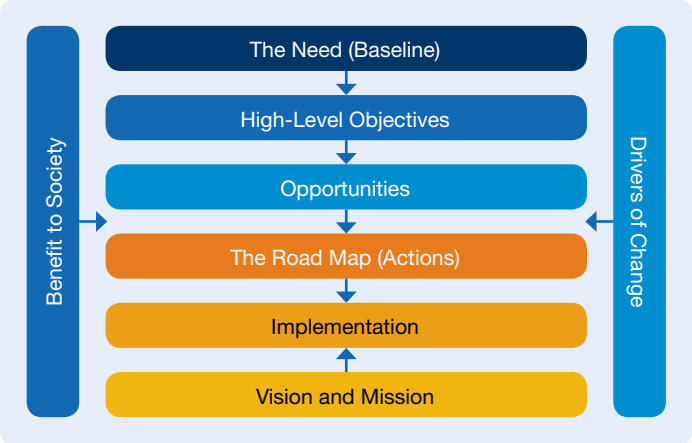


Figure 2: The position of the Road Map in relation to the identified needs, objectives and opportunities in support of the vision and mission.

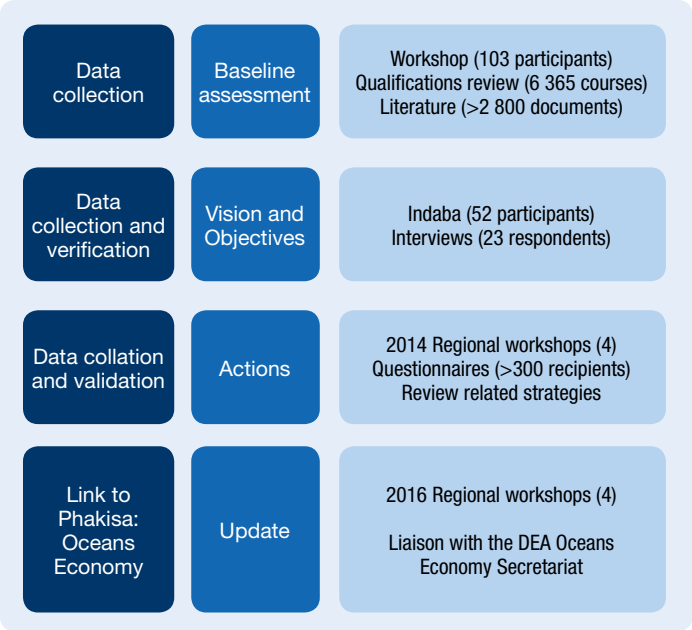
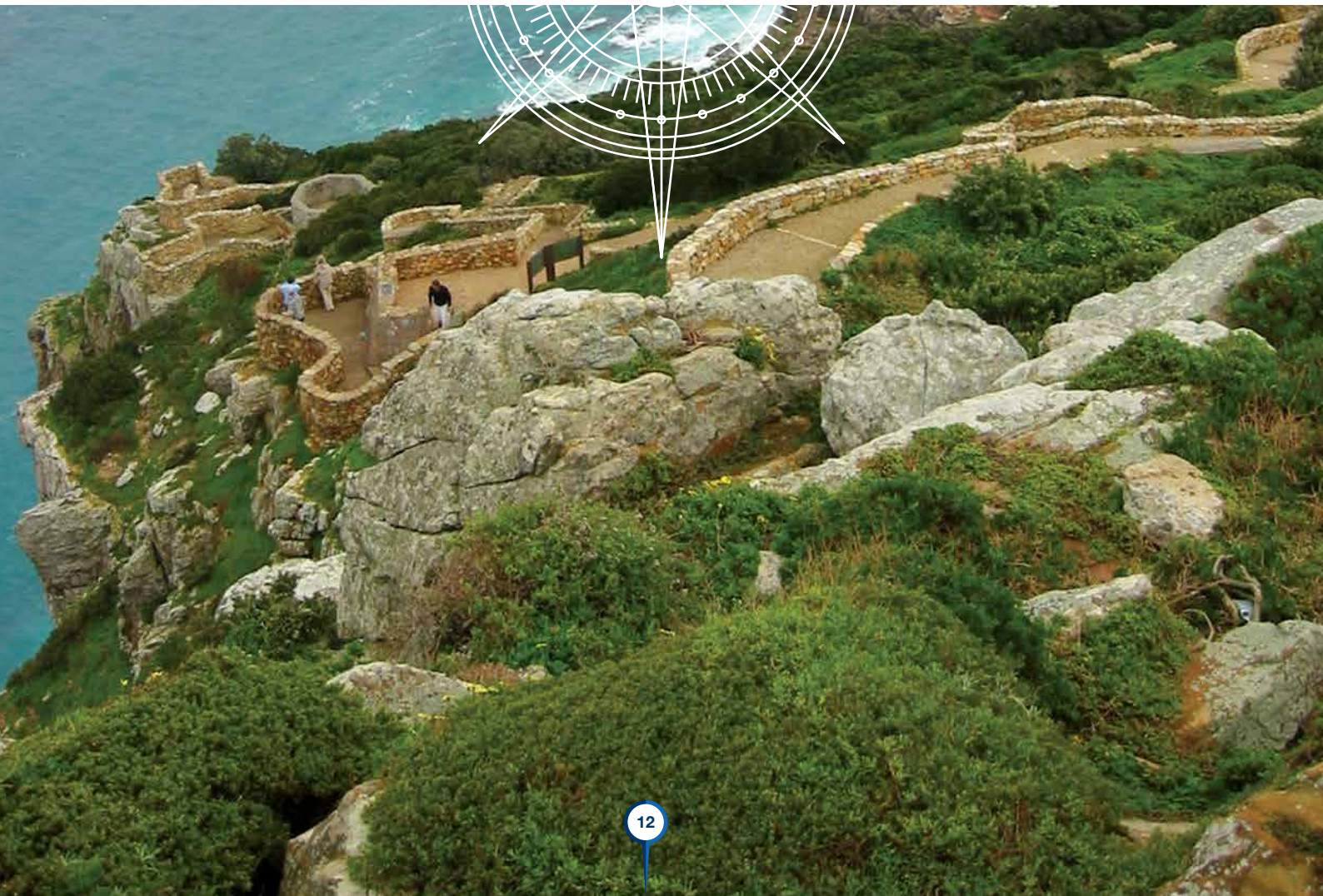


Figure 3: The figure represents the chronology of the development of the Maritime Road Map, with inputs from stakeholder and published data being gathered throughout the process.

VISION AND MISSION



4 VISION AND MISSION

The specific mission supported by this Road Map is:

"Unlocking South Africa's maritime potential through research, development and innovation"

The mission supports the following overarching vision:

"By 2030 South Africa is globally recognised as a maritime nation"

A maritime nation is a nation that:

HIGH-LEVEL OBJECTIVES

5 HIGH-LEVEL OBJECTIVES

The objectives needed to attain the **desired state** for South Africa's maritime sector were identified during the **Integrated Marine and Maritime Technologies Thought-Leaders Indaba**, updated with inputs from two rounds of **regional workshops**, confirmed through **interviews** and validated through a **literature** review. The eight objectives are presented in the figure with their **interdependences** indicated by the blue arrows. The realisation of Objectives 1 to 7 supports the realisation of Objective 8, which can be classified as the overarching objective.

The following sections focus on each of the first seven objectives in terms of the desired state of the objective, the current state of the objective and the actions required to achieve the desired state of through research, innovation and knowledge management.

Objective 1:

"We have a maritime culture and recognise and learn from our maritime history"

Desired state

In 2030 South Africa has in place a maritime culture that infuses all South Africans with a sense of pride and collective ownership regarding the country's rich maritime heritage and history, as well as the future of the maritime sector[2]. This maritime culture is characterised, amongst other things, by a governance system that supports the protection of the country's natural and cultural maritime heritage, an education system that produces and shares knowledge and raises awareness about the country's maritime sector, and a work ethic that seeks to deliver high quality products and services for the maritime sector[2,10]. Furthermore, South Africans recognise and learn from their shared yet diverse maritime history.

Current state

South Africa's maritime culture is currently weak and not consciously fostered. Many South Africans have not been taught to love the sea, and people living inland are particularly distanced from it[2,10]. Generally the South African public is also not aware of the important contribution that South African ports make to the country's economy[3]. This situation is exacerbated by a lack of access to the country's harbours or places where South Africa's maritime heritage is or could be displayed[11,3].

Although South Africa has a rich maritime history (examples include seafaring, maritime technology and vessels), the majority of the country's population is not familiar with it. Furthermore, the maritime sector only tends to remember the colonial and apartheid components of South Africa's maritime history and does not acknowledge other contributions that were made to it, for example those of black seafarers during World Wars I and II[2,10].

Calls for a coherent effort to support, build and foster a national maritime culture [for example in 1996 by the Maritime Transport Policy Working Group (MTPWG)[12] and in 2012 by the Inaugural South African Maritime Industry Conference (SAMIC)[13] have to date not been successful[2,10].

Actions for achieving the desired state through research, innovation and knowledge management

Action 1: Support maritime historical and archaeological research, training and facilities

More funding support needs to be given to:

- research in maritime history and heritage, archaeology, maritime culture and studies that focus on the future of the maritime sector;
- the establishment and maintenance of facilities such as maritime-focused museums and cultural centres; and
- the training, teaching and research activities of maritime archaeologists, historians, education specialists and heritage managers as they can contribute significantly to developing a shared South African maritime culture and historical discourse[11,2,10,3].

10 Funke, N., Nortje, K., Ntombela, C., Meissner, R., Masangane, W. and Claassen, M. 2014. *SAMSA/DST Research, Innovation and Knowledge Management Maritime Road Map project: Interview Notes*. CSIR Report Number: CSIR/NRE/WR/MEMO/2014/0002/C+. Pretoria: Council for Scientific and Industrial Research.

11 Funke, N. 2014a. *SAMSA/DST Research, Innovation and Knowledge Management Maritime Road Map Project: Survey Responses*. CSIR/NRE/WR/MEMO/2014/0003/C+. Pretoria: Council for Scientific and Industrial Research.

12 Maritime Transport Policy Working Group (MTPWG). 1996. *Report to Plenary #2, Report Submitted to the Second Plenary Session of the National Transport Policy Review Initiative convened by the Hon. Minister for Transport*, February 1996, Cape Town.

13 South Africa Maritime Industry Conference (SAMIC). 2012. *Inaugural South Africa Maritime Industry Conference: Delivering on South Africa's Maritime Agenda – A Call for Action*, 4-6 July 2012, Cape Town International Convention Centre (CTICC).

Action 2: Conduct research and use innovative approaches to develop and communicate a co-authored discourse on South Africa's maritime history

More research needs to be conducted at tertiary education institutions and science councils within the humanities and social science disciplines to help construct a maritime discourse that reflects historical narrative inputs from different parts of South African society. The Internet and social media should be used as tools to procure additional inputs to such a co-authored discourse. Here it is important to identify an entity that is willing to take ownership of constructing a shared discourse. Once a co-authored discourse on South Africa's maritime history has been agreed upon, the government needs to help learners cultivate a love for the sea by exploring innovative ways of teaching a maritime history component as part of the school curriculum[14,15,11,2,10,3].

Communicating and raising awareness about a shared version of South Africa's maritime history and other relevant historical and archaeological research can make an important contribution to the development of the country's maritime culture. Advanced technologies and demonstrators (e.g. exhibiting old ships in an educational and attractive manner) or diving tours to discover underwater shipwrecks[16] should be used as ways to raise awareness about South Africa's maritime history[3].

Action 3: Foster national maritime pride

National maritime pride needs to be fostered by developing and raising awareness about innovative research, technology, infrastructure and resources in the maritime sector that South Africans can be proud of. For instance, upgrading South Africa's ports and infrastructure is about increasing national pride in the country's facilities, while training more people in the sector is about fostering pride in its people and their skills. In addition, the sector[17,18] needs to identify innovative ways to protect[19], explore[20,21] and promote South Africa's maritime heritage[11,2,3].

More ways of building national maritime pride are by developing coastal and marine tourism (for example by maintaining and growing the number of Blue Flag beaches[22,23]) in South Africa, and allowing people the opportunity to experience, appreciate and understand the country's ports and harbours. An example is the creation of a harbour route which features a shipwreck trail or a fishing village trail[3], a concept that was recently discussed as part of the Phakisa: Oceans Economy Coastal and Marine Tourism Lab[15].

In addition, dams located inland can be used to promote interest and awareness about South Africa's maritime sector. This would also be a way of involving South Africa's large inland population. Reintroducing the ports and harbours festivals, along with widely celebrating international maritime events, such as the Day of the Seafarer and World Oceans Day, will also go a long way in instilling a sense of maritime pride in the country's population.

14 Two schools in the Eastern Cape have introduced maritime studies into the school curriculum, with plans to roll out this subject to other schools[15].

15 Swift, M. and Zaccheo, S. 2016. *Personal communication regarding linkages between the Maritime Road Map and Phakisa: Oceans Economy*. 17 May 2016, Environment House, Pretoria.

16 This activity is planned as part of the Phakisa: Oceans Economy process[3].

17 The South African Heritage Resources Agency (SAHRA) as the national administrative body responsible for the protection of South Africa's cultural heritage can play a key role in this regard[18].

18 South African Heritage Resources Agency. (SAHRA). 2016. Internet: http://sahra.org.za/. Accessed: 31 May 2016.

19 This could be achieved by attracting tourists to experience South Africa's coastal heritage[3].

20 A good example of a project that seeks to uncover South Africa's maritime heritage is the Eastern Cape Oral Histories project, which aims to investigate the maritime heritage sites and histories of local communities in the Port St Johns area. The project defines maritime heritage as anything that local communities consider significant in terms of maritime and underwater cultural heritage[21].

21 Winton, S. 2014. *Maritime Heritage of the Eastern Cape*. Internet: http://www.sahra.org.za/about/news/maritime-heritage-eastern-cape. Accessed: 29 May 2016.

22 A Blue Flag is an international award that is given to beaches that meet excellence in terms of safety, amenities, cleanliness and environmental standards. The international co-ordinators of the Blue Flag campaign, the Foundation for Environmental Education (FEE), set the strict criteria that Blue Flag beaches have to adhere to. South Africa is the first country outside of Europe to win Blue Flag accreditation for its beaches[23].

23 Blue Flag South Africa. 2014. Internet: http://blueflag.org.za/. Accessed: 29 May 2016.

Objective 2:

"We have an enabling governance framework for the maritime sector"

Desired state

In 2030 anti-silo, cooperative governance arrangements are in place to facilitate an enabling, internationally respected governance framework for the maritime sector in South Africa[24,10]. This governance framework is aligned with relevant international maritime initiatives and needs[25,26], and is characterised by the development and effective implementation of relevant national rules, policies and legislation[2].

Current state

Currently there are government initiatives in place that support the creation of an enabling governance framework for the maritime sector in South Africa. In particular, these include the initiatives under Phakisa: Ocean Economy's Marine Protection Services and Governance (MPSG) focus area. This focus area "aspires to implement an overarching integrated governance framework for sustainable growth to the oceans economy that will maximise socio-economic benefits while ensuring adequate ocean environmental protection within the next five years". Examples of initiatives under this focus area include the enhancement of legislation into the Integrated Coastal and Oceans Management Act or Oceans Act and the review of ocean related legislation[27].

In addition there are signs of political interest and support for the maritime sector. From an international perspective, there is presently a strong regional drive to increase the maritime focus within the Southern African Development Community (SADC) region[28,29], where South Africa holds a position of leadership[24], and in the context of the Indian Ocean Rim Association (IORA), which South Africa forms part of[30,15]. The Department of International Relations and Cooperation (DIRCO) is also playing an active role with regard to promoting multilaterals[24].

Despite these advances, the country's maritime governance space is also characterised by a number of challenges. In the past the maritime sector has reportedly produced numerous strategies, road maps, port development plans, research documents, etc. but very few of these have been implemented. A further challenge is the absence of a maritime industrial policy as well as the lack of capacity and coordination to drive the development and subsequent implementation of such a policy[24]. Additional challenges include the slow pace of transformation in the maritime sector[10] and the lack of effective implementation of institutional arrangements and legislation in the context of ports management in South Africa[31,10].

24 Funke, N. and Claassen, M. 2014b. *Proceedings of the Integrated Marine and Maritime Technologies Thought-Leaders Indaba*. 31 October 2013, Farm Inn, Pretoria. CSIR Report Number: CSIR/NRE/WR/EXP/2014/0049/A. Pretoria: Council for Scientific and Industrial Research.

25 An example of such an initiative is the 2050 Africa's Integrated Maritime Strategy (AIMS), which provides a broad framework for the protection and sustainable exploitation of the African maritime domain for wealth creation[26].

26 African Union (AU). 2012. *2050 Africa's Integrated Maritime Strategy*. Internet: http://pages.au.int/maritime/documents/2050-aim-strategy-0. Accessed: 26 May 2016.

27 Operation Phakisa. 2016a. *MPSG Focus Area Executive Summary*. Internet: w.operationphakisa.gov.za/operations/oel/pmpg/pages/default.aspx?RootFolder=%2Foperations%2Foel%2Fpmpg%2FMarine Protection and Govenance Documents%2FMarine Protection and Govenance&FolderCTID=0x012000B556B9080C268C42BB547329B73E455D&View={4C717C55-EF8E-4D10-AD93-DBCE4099650F} Accessed: 18 May 2016.

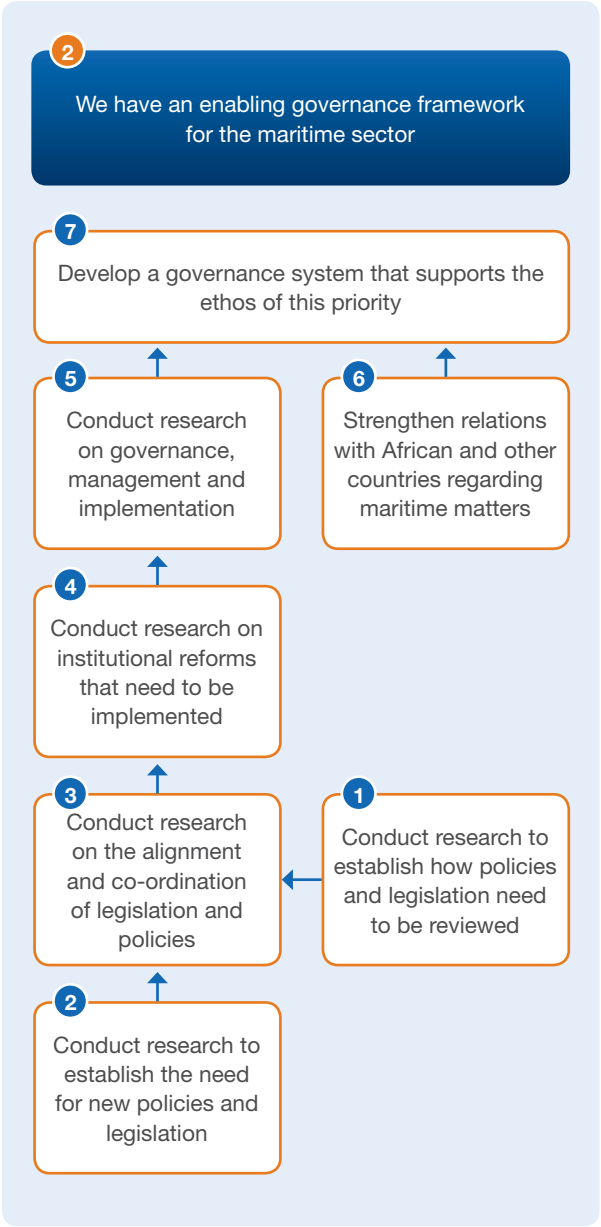
28 An example is the development of the SADC Maritime Security Strategy that was endorsed by SADC's Organ on Politics, Defence and Security in June 2011. The focus of this strategy is to eliminate piracy in SADC's Eastern Indian Ocean[29].

29 Higgs, R.W. 2013. *Keynote Address on the Occasion of the Conference on BRICS and Africa: A Partnership for Sustainable Development*, 12-13 November 2014, Johannesburg. Internet: http://www.saiia.org.za/doc_details/426-bricsafricaconf2013-s4-keynote-admiral Accessed: 18 July 2014.

30 Indian Ocean Rim Association (IORA). 2016. Internet: http://www.iora.net/ Accessed: 18 May 2016.

31 Centre for Competition, Regulation and Economic Development (CCRED). 2014. *Review of Regulation in the Ports Sector*. Internet: http://www.tips.org.za/files/u72/ccred-edd-recbp_regulation_in_the_ports_sector_-_farr_levin.pdf. Accessed: 26 May 2014.

Actions for achieving the desired state through research, innovation and knowledge management



Action 1: Conduct research to establish how certain policies and legislation in the maritime sector need to be reviewed

Research needs to be conducted to establish how existing maritime legislation and policy need to be reviewed (over and above what is already being done as part of Phakisa: Oceans Economy). In other words, such research needs to determine which sections of the existing legislation need to be amended and how. Some policy and legislative issues that need to be investigated include:

- A review of the National Ports Act (Act 12 of 2005)[32,2];
- A review of the Merchant Shipping Act (Act 57 of 1951) and the Merchant Shipping Regulations[33,2];
- A review of the Maritime Transport and Services Industry Sub-Sector Code[34,2];
- Jurisdictional gaps in law, protection, enforcement and prosecution[2]; and
- Identifying which legislation needs to be amended to align with international protocols to which South Africa is already a signatory[2].

Action 2: Conduct research to establish the need for new policies and legislation in the maritime sector

Research needs to be conducted to establish what new policies and legislation are required for the South African maritime sector (over and above what is already being done as part of Phakisa: Oceans Economy). Some policy and legislative issues that need to be investigated include:

- The need for admiralty jurisdiction provisions to attract or encourage banks to invest in new ships[2];
- The introduction of tax incentives:
  - for world cargo transfers passing through South Africa[2];
  - to make South Africa an attractive destination for investment and particularly ship repair[2]; and
  - to substantially reduce port costs for importers and exporters in South Africa[10];

32 Republic of South Africa (RSA). 2005. *National Ports Act (Act 12 of 2005)*. Internet: http://www.portsregulator.org/images/documents/national_ports_act.pdf Accessed: 19 July 2016.

33 Department of Transport (DOT). 2007. *Merchant Shipping (National Small Vessel Safety) Regulations*. Internet: https://www.dwa.gov.za/Documents/Other/RMP/RWUM/SmallVesselSafetyReg8Aug07.pdf Accessed: 19 July 2016.

34 Department of Trade and Industry (DTI). 2014. *Transport Sector Charter: Maritime Transport and Services Industry Sub-Sector Code*. Internet: https://www.thedti.gov.za/economic_empowerment/trans_sector_charter.jsp Accessed: 29 July 2014.

- The need to introduce a cabotage[35] regime[2];
- The feasibility of establishing a maritime ministry or a maritime department within an already existing government department such as DoT[10].
- The need for a national maritime industrial policy and strategy[2];
- The need for a national procurement policy that would enable South African companies to be actively involved in the local and international maritime industry[24];
- The need for a policy to regulate the health and safety of ship workers and immigrant communities at ports[2]; and
- The need for a policy to direct the oil industry to dedicate resources to respond to pollution incidents[2].

Action 3: Conduct research to determine how the alignment and coordination of existing legislation and policies in the maritime sector could be improved

Research needs to be conducted to establish how:

- The environmental impact assessment (EIA) process can be aligned with maritime activities[2];
- Maritime-related activities can be included in the National Climate Change Response White Paper[36,2];
- Shipping and customs procedures in all ports (including SADC ports) can be aligned and coordinated[2,4];
- Industry sector charters (e.g. the Mining Charter) can be reviewed to support the maritime industry[2]; and how
- Maritime-related activities can be incorporated into existing strategic infrastructure programmes and sectoral development plans[2].

Action 4: Conduct research on which institutional reforms need to be implemented in the maritime sector

Research needs to be conducted to establish where institutional reforms are needed for the South African maritime sector. Some institutional reforms that need to be investigated include how to:

- Enable SAMSA to become a world-class maritime authority[37,2,10]; and
- Build and expand on the existing strengths of the South African Navy (SAN)[38,39,10].

Action 5: Conduct research to improve governance, management and implementation in the maritime sector

Research needs to be conducted to establish the most suitable approach to:

- Fast-track work permits for highly skilled people[10];
- Create an attractive environment for the employment of South African seafarers[10];
- Follow an appropriate cluster approach for the development and promotion of competitive maritime industries and the delivery of high quality services at sector/subsector and industry service levels[1].
- Create an enabling environment for small, medium and micro-sized enterprises (SMMEs) to learn from and grow in the maritime sector[10];
- Develop road and rail infrastructure to maximise port utilisation[10];
- Invest in post boat production and marine boating infrastructure and skills development[10].
- Invest in new modern infrastructure (from steel manufacturing to building)[10];
- Identify existing problems at South African ports and develop a coherent strategy to address these[10]; and to
- Introduce independent international benchmarking of port-related activities[10].

In addition, the following actions, though not directly focused on research, innovation and knowledge management, are key to achieving Objective 2's desired state.

35 The right to operate sea, air, or other transport services within a particular territory[7].

36 Republic of South Africa (RSA). 2011. *National Climate Change Response White Paper*. Internet: https://www.environment.gov.za/sites/default/files/legislations/national_climatechange_response_whitepaper.pdf Accessed: 20 July 2016.

37 Areas that require reform include SAMSA reducing the costs of doing business with and within South African ports, SAMSA no longer developing standards and overseeing their implementation at the same time[2], and SAMSA reassessing the role, function and finance of SAMSA authorised agencies[10].

38 The Defence Review Committee (DRC)[39] suggests providing an extensive maritime awareness capability and an offshore patrol capability for SAN in the short term, acquiring heavy sealift vessels for the South African National Defence Force's (SANDF) sea-landed infantry capability, acquiring additional combat support ships, expanding the protection force to battalion size unites, renewing the frigates and submarines, and improving South Africa's mine warfare capability.

39 Defence Review Committee (DRC). 2014. *National Defence Review 2014*. Internet: http://www.gov.za/documents/detail.php?cid=402524. Accessed: 26 May 2014.

Action 6: Strengthen relations with African and other countries regarding maritime matters

This action requires South Africa to build an understanding of its competitive position for shipping lanes, security, etc. and how it can fit into the bigger SADC picture. South Africa needs to develop and implement bilateral agreements with SADC countries to promote collaboration and alignment on expansion, marketing, regulation, etc.[2].

Furthermore, South Africa needs to make an effort to liaise and consult with countries on a similar maritime path, for instance in the context of IORA, and share its experiences with them, as well as learn from their experiences[2].

South Africa also needs to take into account global imperatives when developing strategies to improve its status as a maritime nation and promoting its capabilities and resources on the international market. In particular, South Africa should improve its position on the World's Bank competitive ranking of ports list[2]. The country should also participate in international platforms in order to promote international cooperation[2]. The country will benefit equally from putting in place twinning agreements with other port cities[24].

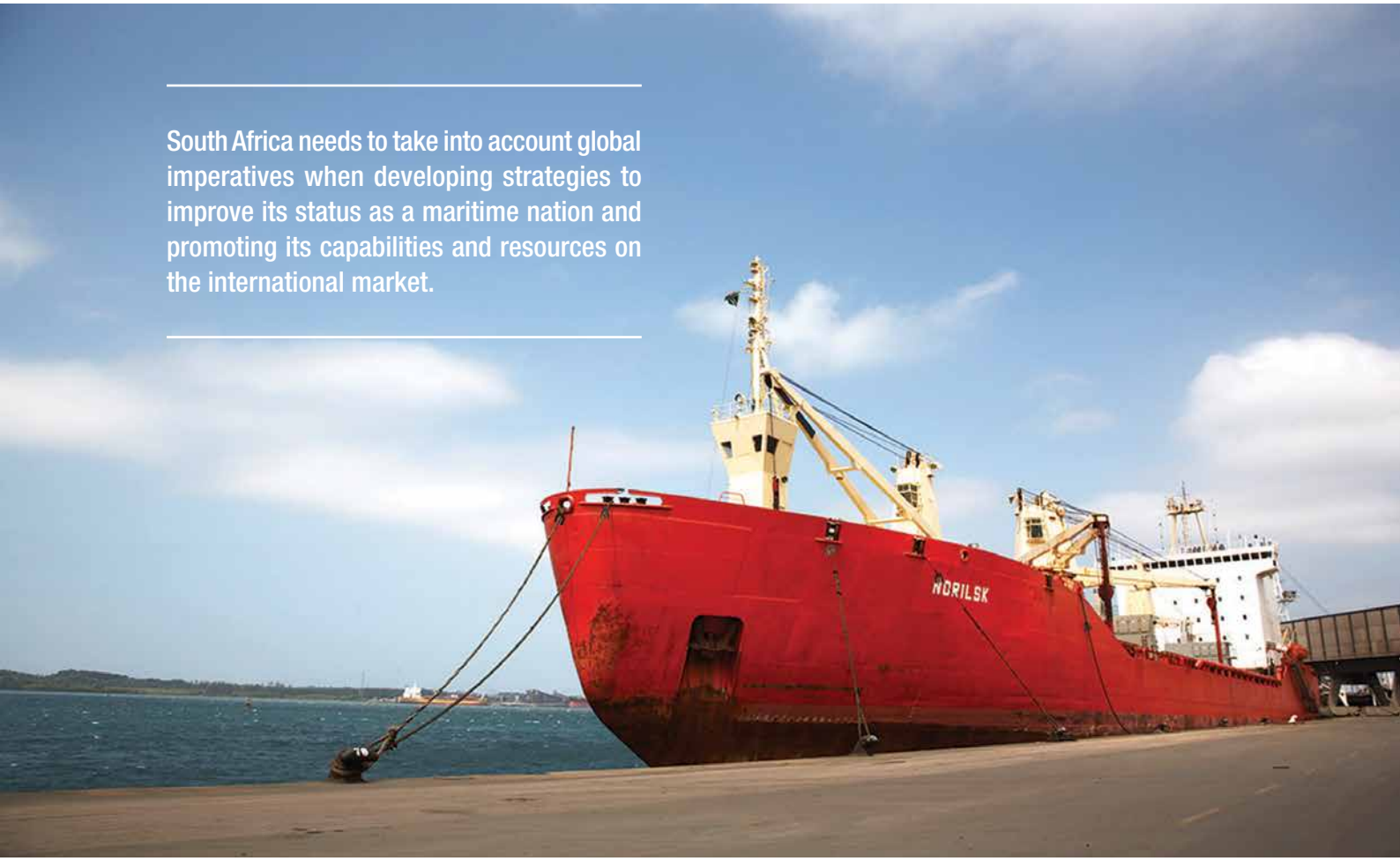
Action 7: Develop an appropriate governance system that supports the ethos of this priority

There is a need to create a governance system for the maritime sector that has the following characteristics:

- The system is geared towards collaboration and knowledge sharing;
- The system is committed to anti-silo cooperative governance; and
- The system facilitates knowledge sharing and specifically data sharing between different government departments.

In order for the governance system to operate effectively different departments need to align their goals to develop a single unified vision for the maritime sector. In addition, streamlined channels of communication between government and the maritime industry are needed. There is also a need for strong leadership in the sector[11,2,10].

South Africa needs to take into account global imperatives when developing strategies to improve its status as a maritime nation and promoting its capabilities and resources on the international market.



Objective 3:

"We have an efficient system of coordination, collaboration and knowledge sharing and have taken measures to reduce red tape in order to promote investment and development"

Desired state

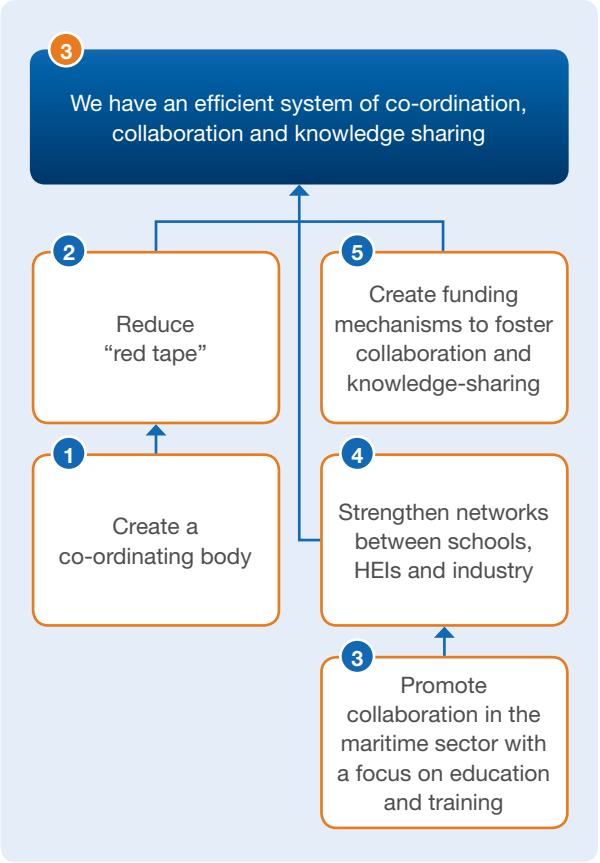
In 2030 there is effective, transparent and structured coordination, collaboration and knowledge sharing between different parts of the maritime sector, as well as between the maritime sector and other sectors. This coordination, collaboration and knowledge sharing serves three goals: firstly to improve government's understanding of the needs and opportunities within the sector; secondly to streamline cooperation between the government departments, stakeholders and other organisations that operate within the sector; and thirdly to identify research needs. These goals are attained through a coordinated effort across different organisations and departments and through a central point of coordination that is effectively supported by appropriate information and communications technology (ICT)[11,2,4,10].

Current state

The current state of coordination, collaboration and knowledge sharing in the maritime sector is generally characterised by poor communication and high levels of competition and mistrust between major players. An example is the yacht and boat building industry where businesses have to compete heavily in order to avoid losing their niche in the market. This and other examples show that there is a definite need to explore ways of facilitating dialogue and improving communication and coordination between all stakeholders in the sector.

Phakisa: Oceans Economy has been identified as a useful and relevant addition to the coordination, collaboration and knowledge sharing space within the maritime sector. While this process has identified a number of initiatives that speak to the need for better coordination, collaboration and knowledge sharing, they are not all geared towards research and innovation[11,10].

Actions for achieving the desired state through research, innovation and knowledge management



Action 1: Create a coordinating body

There is a need to create a coordinating body that addresses the following:

- Coordination and collaboration needs from people across the maritime sector (for example through newsletters or e-portals);

The current state of coordination, collaboration and knowledge sharing in the maritime sector is generally characterised by poor communication and high levels of competition and mistrust between major players.

- Conflict resolution through formal and informal structures that are accessible and transparent; and
- Setting up of an integrated technology platform/ database that is able to integrate diverse information sources for key stakeholders across the sector in order to facilitate decision-making, participatory governance and information and knowledge dissemination.

The establishment of this coordinating body should follow a bottom-up approach rather than a top-down approach to ensure leadership for the sector by the sector. A good starting point for this coordinating body is to build on the activities of existing associations in the sector[11,2,10,24].

Action 2: Reduce "red tape"

Red tape is associated with costs, in the form of time and frustration, to different stakeholders due to cumbersome rules, regulations and/or bureaucratic procedures. In order to reduce red tape, the following needs to be done:

- Determine the most critical red tape issues as a starting point for improvement and reduction through consultation with the sector;
- Enhance the capacity of responsible officials in streamlining and fast tracking processes;
- Identify areas of improvement and efficiencies to be attained through consultation with the sector; and
- Initiate benchmarking, networking, sharing of lessons learnt and best practice on red tape reduction in the sector[2].

Action 3: Promote collaboration in the maritime sector with a focus on education and training

Collaboration with a focus on education and training necessitates the following:

- Better integration of existing higher education initiatives and training courses that are relevant to the maritime sector;
- Better utilisation of already established entities such as SAIMI;
- Clearer acknowledgement of the importance that different kinds of knowledge (for example experiential knowledge vs. academic knowledge) have in the development of the sector as well as sharing this knowledge between different stakeholders; and
- Greater involvement of institutions other than education institutions in education and training activities. For example, SAN could potentially assist with merchant navy training[24,10].

There is a need to promote collaboration in the maritime sector with a focus on education and training.

Action 4: Strengthen networks between schools, higher education institutions (HEIs) and industry in the maritime sector

Schools, HEIs and industry occupy critical positions in the research, knowledge management and innovation value chain. It is therefore important to strengthen the linkages between these entities. The following needs to be done to achieve this objective:

- Both the maritime industry and universities should assist with training educators at schools[40] in order to impart maritime-relevant knowledge to learners and potentially inspire them to pursue careers in the maritime sector;
- Representatives of the maritime industry and universities should visit schools and attend career expos to show learners what career opportunities exist in the sector and inspire them to take maritime-related courses at university;
- Research and courses offered at HEIs need to be industry relevant. The maritime industry should therefore develop a strategy on how to address its needs regarding qualifications, skills and research[41]. A way in which the offerings of HEIS could be made industry-relevant is by asking people with industry experience to teach components of maritime-focused courses[42];
- In order to strengthen linkages with HEIs, the maritime industry should consider sharing its private training programmes with others in the sector; and
- HEIs, the maritime industry and government should collaborate to find ways of converting work experience into qualifications (e.g. trade tests) despite the fact that many maritime sector related trades are no longer recognised in the National Qualifications Framework (NQF)[2,10,11,24].

Action 5: Create appropriate funding mechanisms to foster collaboration and knowledge sharing

Funding mechanisms should be created to facilitate the co-development of projects between universities and the maritime industry. This could also relate to universities collaborating with key maritime nations and/or partners. These funding mechanisms should include the following pre-requisites:

- Projects benefitting from such funding streams must contribute to the development of new knowledge and capacity within the sector;
- Intellectual property (IP) must be declared by all parties receiving funding for a project; and
- Project deliverables must be tailored to the needs of the maritime sector so that the knowledge resulting from the collaboration can be used[2,10].

40 For this purpose, educators could make use of maritime-related Internet sources that have been adapted for a school environment.

41 Here the maritime industry could take inspiration from examples such as the relationship between Delft University of Technology (TU Delft) and Damen Shipyards Group.

42 A way of testing whether courses are sufficiently industry relevant is by introducing qualitative assessments to ensure that new graduates entering the job market are able to do what is required of them.

Objective 4:

"We utilise our resources sustainably and protect our natural resources in the EEZ"

Desired state

In 2030 environmental protection in South Africa's EEZ is supported by an awareness of the importance of marine resources for the country. Furthermore, environmental protection includes a focus on dealing with impacts on these resources (such as pollution), supporting the sustainable utilisation of these resources and understanding physical, chemical and biological marine processes.

Current state

DEA is currently responsible for the protection of coastal and marine ecosystems, with the Oceans and Coasts Branch supporting the establishment, management and maintenance of ecologically representative national and cross-border systems of protected areas. This is achieved through the establishment and development of a comprehensive and ecologically representative national network of protected areas that safeguards key ecological processes across the landscape and provides resilience against climate change, as well as the policy and legislation relating to and monitoring performance of protected areas[43]. The process of establishing marine protected areas (MPAs) has been accelerated under the Phakisa: Oceans Economy MPSG focus area, which aims to protect the ocean environment from all illegal activities and promote its multiple socio-economic benefits with results by 2017, including an MPA representative network, reducing illegal activities and monitoring water quality[27]. Since the launch of Phakisa: Oceans Economy and the MPSG focus area in October 2014, 22 MPAs have already been established[15].

Similarly, the Fisheries Research and Development Branch of the Department of Agriculture, Forestry and Fisheries (DAFF) works to advise on and promote the sustainable utilisation of fisheries, resources and ecosystems, as well as the sustainable development of aquaculture by means of leading, managing and supporting appropriate natural science and fisheries research[44]. These activities are supported by the Phakisa: Oceans Economy's Aquaculture focus area. The goal of this focus area is to grow aquaculture so that it can play a major role in the supply of fish products and an enhanced role in job creation and contribution to South Africa's economy. The focus area aims to increase sector revenue from R 0.67 billion to R 3 billion, production by 20 000 tonnes and jobs from 2 227 to 15 000[45].

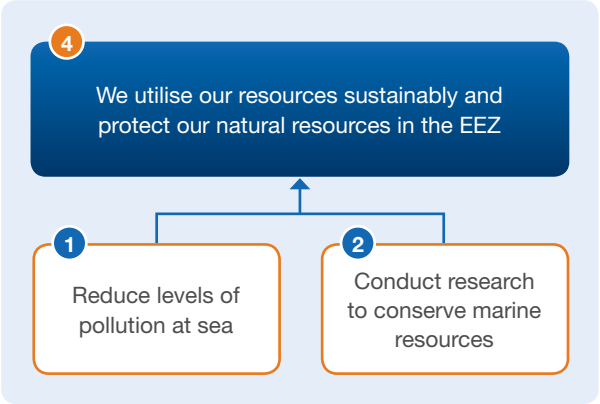
Despite the efforts of these departments, the environmental protection of South Africa's marine resources still lacks much of the financial support it so urgently requires[2].

43 Department of Environmental Affairs (DEA). 2014. *Oceans and Coasts: Purpose and Functions*. https://www.environment.gov.za/branches/oceans_coast Accessed: 2 June 2014.

44 Department of Agriculture, Forestry and Fisheries (DAFF). 2014. *Fisheries Research and Development*. http://www.daff.gov.za/daffweb3/Branches/Fisheries-Management/Fisheries-Research-and-Development. Accessed 7 July 2014.

45 Operation Phakisa. 2016b. *Aquaculture Focus Area Executive Summary*. http://www.operationphakisa.gov.za/operations/oel/aquaculture/pages/default.aspx?RootFolder=%2Foperations%2Foel%2Faquaculture%2FOil%20and%20Gas%20Documents%2FLab%20Documents&FolderCTID=0x012000730C0E1759FB824CB6352F2CBF031FD7&View={6713EC3F-498E-43D6-9A28-EED2B4E05933} Accessed: 19 May 2016.

Actions for achieving the desired state through research, innovation and knowledge management



Action 1: Reduce levels of pollution at sea

Research should be conducted to:

- Develop technology to prevent and combat pollution by ships[10];
- Develop technology to track who is responsible for and prevent future oil spillages[2];
- Investigate the need for a nationally funded central authority that is responsible for safety and security [along the lines of the United States of America (USA) Coast Guard[46]];
- Investigate the development of empowerment programmes for coastal communities;
- Investigate ways to build on the activities of the SAN and the National Sea Rescue Institute (NSRI) to improve communications and the tracking of vessels on the South African coast[2].

In addition, there is a need to broaden the vessel tracking system for all licenced fishing vessels and make available sufficient funding and resources to provide protection for renewable and non-renewable resources within the EEZ[2].

Action 2: Conduct research to conserve marine resources

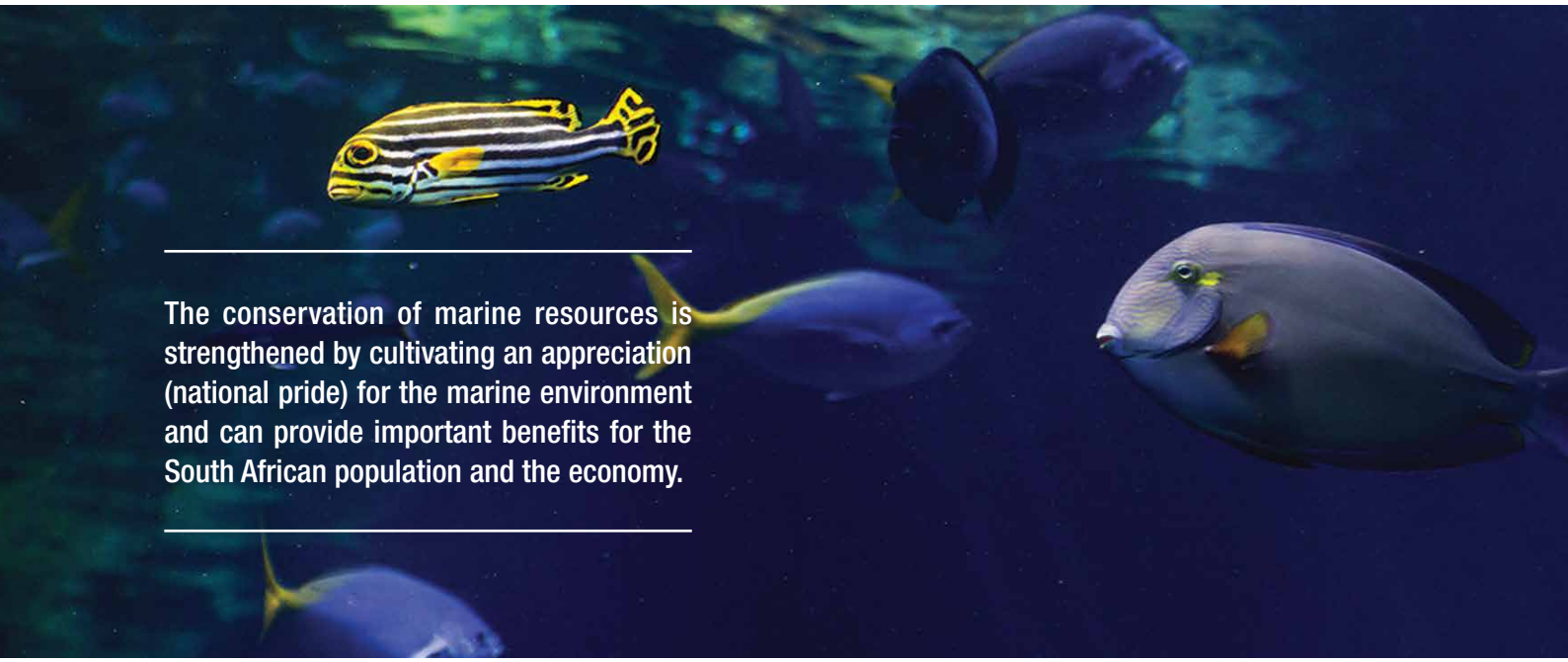
Environmental sustainability is promoted through adherence to national environmental legislation, as well as international conventions and agreements[59]. The conservation of marine resources is strengthened by cultivating an appreciation (national pride) for the marine environment[2] and can provide important benefits for the South African population and the economy.

Research is required to:

- Develop a thorough understanding of the natural marine and freshwater environments[2];
- Map available resources (wave, ocean currents, mineral etc.)[2]; and
- Identify environmentally sensitive areas on the country's coastline and establish a database for them[2].

More extensive deployment of fisheries inspectors for the sustainable and responsible exploitation of the country's ocean resources is imperative for successfully implementing this action[2].

46 See http://www.uscg.mil/ for more information on the US Coast Guard.



Objective 5:

"We have a research, innovation and knowledge management system that is relevant, well-functioning, targeted and multi-disciplinary"

Desired state

In 2030 South Africa has a relevant and well-functioning knowledge management system in place that operates on the basis of reliable and relevant data[4]. This is complemented by targeted multi-disciplinary R&D and technology which have made South Africa a leader in a variety of areas such as maritime energy production systems, human and social science based maritime research and policy development[24,47]; environmental monitoring, surveillance and warning; sea rescue, as well as niche technology development. In addition, South Africa's maritime innovation system is strong and rigorous, and protects as well as commercialises IP rights[24].

These achievements are the result of a strong and coherent maritime-focused education system. This education system:

- Instils a passion for water and boats amongst learners[48,10];
- Focuses on maritime skills[49], (e.g. naval architecture, seafaring and marine engineering);
- Maintains a good standard of education in the maritime sector;
- Stays competitive in terms of the cost and duration of education and has enabled South Africa to retain its position on the International Maritime Organization (IMO) White List[50,10];
- Offers university programmes with a focus on making students employable by providing practical exposure to the maritime industry[24];
- Has world class training facilities in order to be able to export skills[2];
- Attracts key investment in human capital development, which could contribute to economic growth[4]; and
- Supplies knowledge-based expertise to the rest of Africa and the world[10].

Current state

The current state of research, innovation and knowledge management in South Africa is still far removed from the desired state. A number of opportunities exist[51], however, and quite a few have recently been created, especially since the launch of Phakisa: Oceans Economy. Two examples are SAIMI, which is funded by the Department of Higher Education and Training (DHET) and has been established to coordinate all skills and capacity building activities within the Phakisa: Oceans Economy process[3] and the South African Marine Research and Exploration Forum (SAMREF), a platform that aims to foster collaboration between the scientific community and the oil and gas industry as well as other offshore resource extraction industries[3].

Despite these promising developments, there are still a number of areas that need improvement. For example, there is still a lack of relevant tertiary education in maritime-related subjects. In instances where such subjects are being offered, too much emphasis seems to be placed on academic training as opposed to practical training or apprenticeships. In addition, there is still a problem with the quality and relevance of further education and training (FET) based qualifications to the maritime sector.

The development of scarce skills and the retention of people with such skills in South Africa is also an issue of concern[52]. Not only are there very few individuals with scarce skills in the maritime sector, these individuals are finding more lucrative employment overseas, and those who are still in the country are retired or close to retirement age. In addition, jobs with scarce skills requirements need to be created within South Africa in order to absorb new entrants into the job market.

There is also a strong need to develop industry relevant R&D, technologies and innovation for the maritime sector. The problem is that universities do not currently house enough departments for maritime relevant disciplines. In addition, university IP regulations often state that the IP needs to remain with the university, which can severely inhibit the funding or use of this work by the maritime industry[10].

47 Meissner R. 2014. A Critical Analysis of Research Paradigms in a Sub-set of Marine and Maritime Scholarly Thought. In: *Reflections on the State of Research and Technology in South Africa's Marine and Maritime Sectors*, edited by N. Funke, M. Claassen, R. Meissner and K. Nortje. ISBN: 978-0-7988-5617-1. Pretoria: Council for Scientific and Industrial Research.

48 See the Cape Windjammers Education Trust (CWET) as an example: www.capewindjammers.org.za

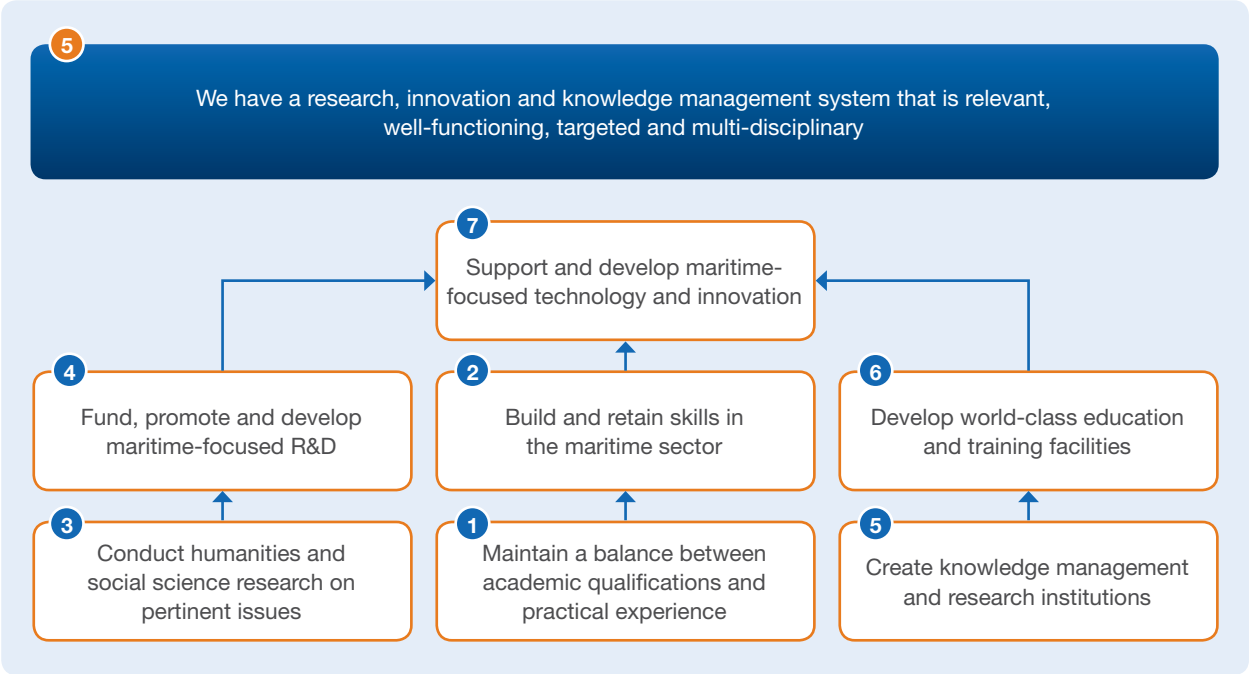
49 It needs to be kept in mind that these skills will not be developed immediately and that it will take time for people to plough their skills and learning back into the maritime sector over time[2].

50 The IMO White List lists countries that have a very good standard of qualifications and capabilities. Mariners from these countries are allowed to work on any ship in the world. It is critical that training of mariners remains of a high quality so that South Africa can remain on this list[2].

51 See Appendix 1

52 See Appendix 2

Actions for achieving the desired state through research, innovation and knowledge management



Action 1: Maintain a balance between academic qualifications and practical experience in the maritime sector

A balance needs to be found between the value placed on academic qualifications and offering practical experience to students of maritime-related subjects and courses. This needs to be facilitated in a number of ways:

- Courses should be offered with a set number of academic modules and the requirement to gain practical experience between modules (during which students are also able to earn money);
- HEIs should adopt a staggered approach where different kinds of qualifications build on one another depending on the skills that individuals need to acquire. These qualifications could start with a certificate (support level), followed by a national diploma (for more advanced skills), then a degree and finally post-graduate studies[10];
- Internships/apprenticeships in the maritime sector should be promoted. In addition, in order to ensure that these internships/apprenticeships result in a worthwhile contribution to the maritime industry, there is a need for longer-term projects for interns/apprentices to participate in[10]; and
- Mentorships should be promoted in order for newly qualified graduates to become competent workers in the maritime environment[2].

Action 2: Build and retain skills in the maritime sector

It is important that skills are built and retained within the sector. There are a number of ways in which this should be done:

- Develop strategies to ensure that skills are not lost due to problems of high staff turn-over or many people with technical skills reaching retirement age;
- Investigate ways of formally recognising skills that currently receive no formal acknowledgement[4,10];
- Create a maritime sector education and training authority (SETA) whilst identifying and addressing problems within existing maritime-relevant SETAs;
- Assess the quality and relevance of FET based qualifications to the maritime sector, and develop an understanding of the challenges that FET colleges face[10].

Government also has an important role in retaining and building skills within the sector:

- Government should endeavour to understand the needs, interests and expectations of a younger, more racially and gender diverse group of people who are involved in the maritime sector. These individuals should ideally shadow older people who are close to retirement age[10].

- It is important for government to understand the needs of people who are already established in their careers but might need further skills development and additional funding to pursue this[2].
- Government should therefore help create an environment that allows different partners to build and retain skills in the maritime industry.

Action 3: Conduct humanities and social science research on pertinent issues in the maritime sector

Research from the perspective of the humanities and social sciences can make an important contribution to better understanding pertinent issues in the maritime sector. Such research should, among other topics, investigate the following issues:

- Lessons from South Africa's maritime history;
- South Africa's maritime culture;
- Public health issues in the maritime sector;
- Labour issues in the maritime sector;
- Livelihoods of port communities;
- Maritime archaeology;
- Gaps and issues within legislation and policy that need to be addressed;
- A comparison between South Africa's maritime-related policy and legislation and international best practice;
- The human dimensions of the maritime cluster;
- Gendered spaces in the industry[2].

Research done by the Human Sciences Research Council's (HSRC) Maritime Technical Task Team as well as other maritime-focused studies that have been conducted from the perspective of the humanities and social sciences[53,54], should be considered as an input into efforts to turn South Africa into a leading maritime nation[2].

Action 4: Fund, promote and develop maritime-focused R&D

R&D should be funded, promoted, developed and integrated into the broader supply chain and national R&D strategy. Research outputs should also support national planning initiatives and should be functional in terms of safety, compliance, commercial viability and professional conduct[2,10].

Here are some key research topics that have been identified by stakeholders in the maritime sector:

- A foresight study to focus/align research in the maritime sector;
- A study to ascertain what research has already been conducted at masters or doctoral level at HEIs;
- A map of available resources (wave, ocean, current, mineral, etc.);
- A study of approaches used by other nations when they set out to grow their maritime status;
- A market survey/study to determine the real value or importance of developing the sector further;
- A skills gap and requirements study for the period 2015-2030 in line with National Development Plan (NDP) imperatives;
- A study to determine how long it will take for a new company or start-up company to move from its initiation phase to acquiring a licence to operate;
- A logistics/transportation sector analysis across all transport modes (supply chain);
- Process simulations across the supply chain to determine inefficiencies optimisation (e.g. ports simulations)[2];
- A study to determine how to manage South Africa's ports more efficiently and effectively[10];
- An economic feasibility study for introducing an African or South African cabotage regime;
- Physical oceanographic research;
- Marine technology research[2];
- A study to determine what maritime sector specific niches, capabilities and technologies exist[10];
- Research with a maritime application by researchers from a mechanical engineering, electronics, ICT, structural and civil engineering and materials background to encourage innovation[55];
- Research on diamond mining and boat building; and
- Naval architecture research[10].

53 This includes the work of Hyslop on the history of steamships and Zulu seafarers, the work of Ruggunan on globalisation, unions and seafaring labour markets, the work of Bonnin on training and development, the work of Morris on dockworker labour, and Trotter's work on seafarers and sex workers in Durban and Cape Town[54].

54 Ruggunan, S. 2014. Email communication on 30 April 2014, University of Kwa-zulu Natal, Durban.

55 South African Maritime Safety Authority (SAMSA). 2013. *Draft Concept Document: Maritime Research, Innovation and Knowledge Management 2013*. Pretoria: South African Maritime Safety Authority.

Action 5: Create knowledge management and research institutions in the maritime sector

The following is needed:

- A national board established outside of the university structure to coordinate research needs;
- A national association of maritime training and research associations[2]; and
- A national repository for geographic information system (GIS) data and hydrographic coastal and inland marine spatial knowledge[56].

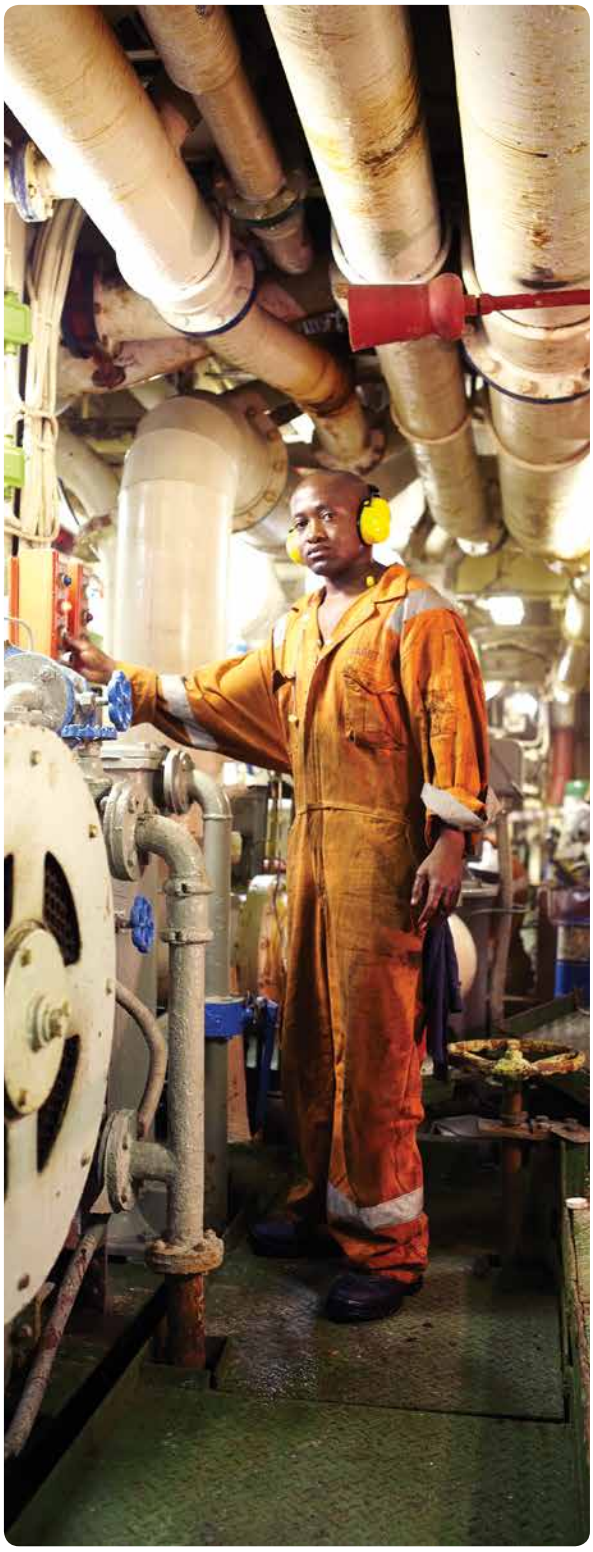
Action 6: Develop world-class South African maritime education and training facilities

South Africa has to commit to the development of world class maritime-relevant education and training facilities. The development of skills should speak to both local and international skills requirements. Such a focus will enable South Africa to build and support the international maritime sector as well as its own[11].

In addition, South Africa should aim to collaborate more with overseas universities by, for example developing joint higher education programmes and hosting more international conferences[2]. At the same time, the country should become involved in regionalising its education and training capacity. South Africa is privileged to be on the IMO White List and should collaborate with and assist other African countries with their education and training[10].

Action 7: Support and develop maritime-focused technology and innovation

The South African government needs to nurture and develop local maritime industry incubation programmes (which includes funding and supporting new technologies and innovation) to enable them to become locally and internationally competitive[2]. Applications developed in other sectors that may be relevant to the maritime domain should also be investigated and integrated into the maritime sector where possible[4].



56 Funke, N. 2014b. *SAMSA/DST Research, Innovation and Knowledge Management Maritime Road Map project: Feedback on Draft Road Map*. CSIR Report Number: CSIR/NRE/WR/MEMO/2014/0005/C+ Pretoria: Council for Scientific and Industrial Research.

Objective 6:

"We have structured financing of initiatives in the sector and sustained maritime economic growth"

Desired state

In 2030 South Africa is exploiting its geographical location to support economic growth in the maritime sector but is at the same time working to create harmony with its neighbours[24]. The government has managed to firmly entrench the ethos of Phakisa: Oceans Economy by recognising that economic activities within the maritime sector have the potential to make a substantial contribution to the GDP. Prioritising the advancement of South Africa as a leading maritime nation has been deemed a government priority and as a result has meant an injection of funds from the state and the private sector. This initiative is also understood in the context of South Africa as a developmental state with the aim of growing the economy, creating jobs and reducing inequality[57]. In particular, measures have been taken to reduce bureaucratic red tape and to render the South African maritime sector more attractive to investors. The role of government has been of key importance to supporting such economic growth through enabling legislation, public-private partnerships (PPPs) and structured financing of initiatives, for example, those related to the construction and repair industry.

Current state

The maritime sector is very traditional in its economic growth outlook and also extremely fragmented with a tendency towards "silo thinking". The sector has a long history and has always been "controlled" by large corporations. It seems to lack a tangible spirit of entrepreneurism, specifically in the context of SMMEs. Such small companies also do not have a single, effective, industry-wide representative body that can speak on their behalf. In addition, conversations in maritime financing tend to focus only on shipping, whereas finance is also needed in other sub-sectors, such as marine aquaculture and marine tourism[24,10]. It should be noted, however, that Phakisa: Oceans Economy has paid quite a bit of attention to these issues, especially with regards to the support of SMMEs in the aquaculture sector[3].

Other challenges to the maritime sector include the competition to South African shipyards presented by the lower cost of building ships in foreign shipyards as a result of lower wages, less regulation and the ready availability of government support and financial aid. This has resulted in a significant number of yacht building companies closing down in recent times due to financial challenges[13].

Capital investment in the maritime sector is also still low compared to other countries, probably because banks (and government) do not understand the sector well. In addition, bank guarantees for projects are much more expensive in South Africa than competing maritime countries. This has had an impact on the cost of project delivery[13]. However, this situation is slowly changing due to Phakisa: Oceans Economy's considerable financial injection into the sector.

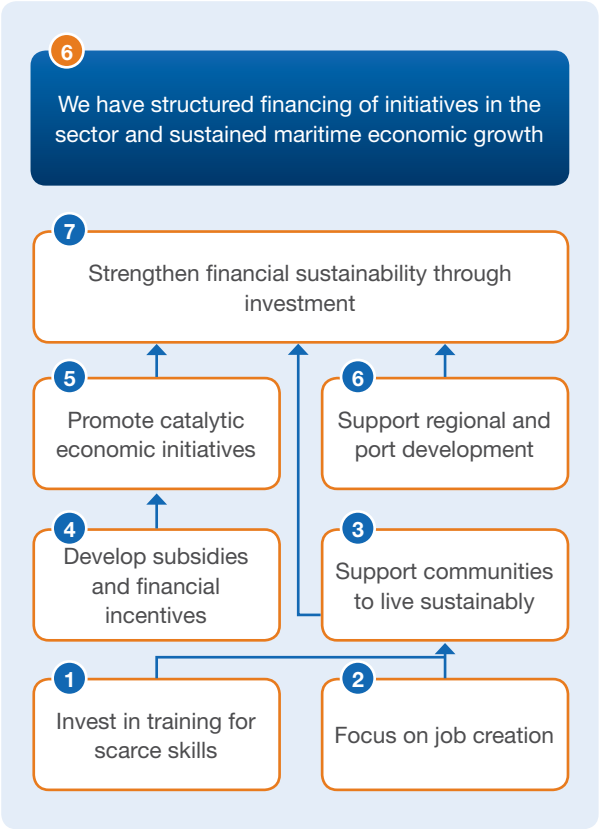
South Africa's ports only offer a limited range of services, causing the country to miss out on a number of socio-economic development opportunities. Furthermore, there is no integrated marketing and awareness campaign to effectively position the value proposition of South African ports[13]. In response to these issues, Phakisa: Oceans Economy has identified South African ports and harbours as an important component of its strategy and has committed R7 billion for new port facilities and refurbishment[58]. Continued investment is however needed to ensure future and sustainable success in this regard.

There is also an emerging economic focus on the marine environment as a new area for economic exploration. Marine phosphate mining, which involves strip mining the ocean floor for phosphate, is an example of this. Phosphate is a valuable commodity, which in turn makes marine mining economically viable[3].

57 National Planning Commission (NPC). 2011. *National Development Plan*. Internet: http://www.npconline.co.za/pebble.asp?relid=25 Accessed: 26 June 2014

58 President Jacob Zuma. 2015. *2015 End of Year Statement by President Zuma: Building a Better South Africa, Better Africa and a Better World*. Internet: http://www.thepresidency.gov.za/pebble.asp?relid=21310&t=79 Accessed: 24 February 2016

Actions for achieving the desired state through research, innovation and knowledge management



Action 1: Invest in training for scarce skills in the maritime sector

It is important for government and the private sector to provide funding for maritime-related education and training to address the problem of scarce skills and to enable individuals to take on employment opportunities[2]. In addition, subsidies should be made available to industries in the maritime sector to absorb, train and develop qualified people[4].

In particular, investment is needed in the following areas:

- Skills development for ship building and ship repair;
- Trans-skilling (e.g. taking people who have skills in the chemical and textile industry and transferring these skills to the composite industry);
- The development of training courses that focus on the fishing industry, coastal issues, offshore oil and gas and the deep sea merchant marine fleets;
- The development of maritime streams for humanities and social-science focused research;
- Student bursaries and support;
- Bursary schemes for teachers in the maritime sector; and
- A dedicated maritime education fund[2].

Action 2: Focus on job creation in the maritime sector

Job creation can be promoted through implementing an industry empowerment model that identifies research and innovation requirements for creating new employment opportunities. Job creation initiatives will benefit from the finalisation and approval of the Draft South African Maritime Transport Policy[59] and prioritising broad-based black economic empowerment (BBBEE)[60].

Action 3: Support communities to live sustainably

Many coastal communities derive a living from coastal and marine resources, but these communities often lack the necessary financial resources and risk mitigation measures to effectively sustain their livelihoods. Financial instruments need to be made available to harness technological advances and promote sustainable use of resources to ensure social and economic stability in coastal communities[2]. Furthermore, communities should be encouraged to start cooperatives to enable them to access the opportunities within the maritime industry.

Action 4: Develop subsidies and financial incentives for the maritime sector

Subsidies and incentives can be used as innovative means to stimulate economic development in the maritime sector. Such subsidies can be direct (such as investments) or indirect (such as tax rebates) and can include accelerated depreciation, where the cost of capital equipment is covered. Innovative means can also be developed to favour ships carrying the national flag for cabotage and coastal trade[61]. Research should be conducted on tax relief for investment in maritime equipment and facilities and tax on cargo passing through South Africa. Subsidies, tax relief and incentives should be tailored to fit the maritime industry rather than being too generic[2]. Here it is very important for the financial industry to understand the maritime sector from both a commercial and a development perspective.

59 Republic of South Africa (RSA). 2008. *Draft South Africa Maritime Transport Policy*. Internet: http://www.gov.za/sites/www.gov.za/files/Draft%20Maritime%20Transport%20Policy%202008_0.pdf Accessed: 20 July 2016.

60 Republic of South Africa (RSA). 2013b. *Department of Transport Strategic Plan – Revised*. Internet: http://www.transport.gov.za/Portals/0/Annual Reports/DoT Strat plan.pdf Accessed: 26 May 2014.

61 Department of Transport (DOT) and the South African Maritime Safety Authority (SAMSA). 2011. *Maritime Sector Skills Development Study. Transforming the National and Regional Maritime Landscape.* Pretoria: DOT and SAMSA.

Action 5: Promote catalytic economic initiatives in the maritime sector

The role of catalytic initiatives to promote economic development in the maritime sector needs to be investigated. An example is a maritime shipping policy that can provide a framework for promoting businesses within the maritime transport industry[60]. The maritime sector should engage with development finance institutions and private funders to support sector growth[13]. The establishment of venture capital projects and funding for maritime projects will also catalyse economic growth. Specific examples of catalytic funding are floor plan financing for small recreational boats and the DTI Stock Boat Manufacturing and Marketing Programme[62,2,63].

It is also important to finance support infrastructure for ancillary services, e.g. chandling, stevedoring, tallying, clearing, forwarding and trucking. Aquaculture and fish farming are additional important areas that could catalyse economic development as they have a number of activities linked to them. A focussed research effort is required to define priorities for catalytic activities and establish clear economic development pathways to present robust business cases to financiers. Here Phakisa: Oceans Economy might offer useful examples.

Action 6: Support regional and local port development

Regional development should be promoted through the following:

- Enhancing export growth through anchoring transport and development corridors at ports[59] and in inland ports;
- Linking up with the Brazil, Russia, India, China, South Africa (BRICS) financing strategy regarding the East-West corridor development[2];
- Making land available, wherever practical in and around ports for ship and boat building related activities, including building, launching, refit and repair[10] ; and
- Creating economic zones for related supply chain activities.

The concentration of business around ports will promote regional development towards economic growth in the maritime sector. The development of spatial development frameworks (SDFs) for port areas should be underpinned by research and informed by stakeholder processes. Such frameworks should identify areas that are allocated for potential economic gain, but scientifically defensible research should identify which areas can be set aside for economic development, and which ecologically sensitive areas require protection.

In a regional context, the benefits and risks of oil and gas exploration should also be considered. As already previously mentioned, SAMREF could play a role here.

Action 7: Strengthen financial sustainability by encouraging investment by government and the private sector

Financial sustainability in the maritime sector depends on good returns to investors. Whereas such returns are typically focussed on economic growth for private investors, they will also mean social and environmental benefits for the public sector. The emergence of PPPs provides a means to balance these perspectives. An analysis of the different funding instruments and sources as well as potential benefits to investors will provide a solid foundation to implement innovative solutions to ensure financial sustainability in the sector.

62 The scheme is supported by South African Boatbuilders Export Council (SABBEX) and is aimed at local multihull builders who meet the requirements set out by the Industrial Development Corporation (IDC), the DTI and SABBEX. Successful applicants receive a loan at a preferential interest rate to build the boat and are only required to repay it once the boat has been sold with a reasonable time period being allowed to market the boat[63].

63 Manufacturing Competitiveness Enhancement Programme (MCEP) .2014. *Scheme Helps to Build an Industry*. Internet: http://www.investmentincentives.co.za/mcep/beneficiaries/success-stories1/113-scheme-helps-to-build-an-industry. Accessed: 28 July 2014

Objective 7:

"We prioritise safety and security and military protection within and beyond our EEZ"

Desired state

In 2030 South Africa fulfils its national and regional responsibilities by ensuring maritime safety in terms of navigation, vessel tracking, maritime security, the protection of the marine environment and by protecting and promoting its maritime interests[64]; this includes a focus on the country's inland waterways[65,66,4]. This state of affairs also relates to managing of regulated, legal economic activities within the South African waters and the country's inland waterways.

By this date, South Africa also has a fully developed maritime domain awareness (MDA) system which compares favourably to IMO standards[67,68]. As such South Africa's MDA provides an effective understanding of any impacts associated with the maritime domain that could impact on security, safety, the economy or the environment.

Current state

Currently compliance with safety standards in certain parts of the South African maritime sector, such as fishing fleets, is reportedly decreasing and need to be addressed. Safety concerns furthermore relate to the requirement for improved ship traffic control and management, as well as to occupational health and safety needs, in particular those of ship workers or immigrant communities in ports[4].

A further problem is that of foreign fishing which is currently impacting on the EEZ. Attention also needs to be paid to increased protection against pirates to secure the Southern African trade route and facilitate activities such as oil and gas exploration[4]. In this regard, it can be argued that maritime security is a prerequisite for sustainable development and that securing the maritime domain is very important to protecting South Africa's national interest[29].

South African legislation does allow for the salvage of wrecks, but the International Convention on Salvage does not – a conflict that needs to be resolved. A related problem is that of illegal salvage and the smuggling of artefacts. In order to address this and related problems, 22 MPAs have been created as part of Phakisa: Oceans Economy, however, substantial resources will need to be made available to protect these MPAs.

Actions for achieving the desired state through research, innovation and knowledge management

64 South African Maritime Safety Authority (SAMSA). 2014. Internet: http://www.samsa.org.za/about Accessed: 31 May 2016.

65 Recreational inland water safety is also included in the scope of safety and security. Inland water safety is linked to environmental conservation (for instance, the clearing of alien aquatic plants on inland water ways) and promoting safe access and use of water and boating safety[66].

66 Centre for Public Service Innovation (CPSI). n.d. *Inland Maritime Safety*. Internet: https://www.google.co.za/?gws_rd=ssl#q=CPSI+inland+water+safety+programme Accessed: 26 May 2014.

67 According to the IMO, MDA should equate to "an effective understanding of any impacts associated with the maritime domain that could impact on security, safety, the economy or the environment. The maritime domain is defined as all areas and things of, on, under, relating to, adjacent to, or bordering on a sea, ocean, or other navigable waterway, including all maritime-related activities, infrastructure, people, cargo and vessels and other conveyances"[68].

68 International Maritime Organisation (IMO). 2014. *International Convention for the Safety of Life at Sea (SOLAS).* Internet: http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-%28SOLAS%29,-1974.aspx Accessed: 27 June 2014.

Action 1: Enhance existing technologies and conduct research to promote safety and security in the maritime sector

South Africa has already developed technologies (e.g. a satellite system and stratospheric communications platform) that can be used to avoid the capturing of ships by pirates. The following should be enhanced through further research:

- The deployment of unmanned aircraft systems in the marine and maritime environments. This could increase safety of vessels and environmental protection.
- Harnessing and combining existing sensor networks [space, radar, optics, an automatic identification system (AIS), etc.] for the management and protection of the maritime EEZ, assets and resources[4].

Furthermore, South Africa's extensive research capabilities should be utilised towards the development of new innovations. An example is research that is directed at the monitoring of environmental changes, such as large wave storms, in order to maintain safety at sea and support shipping and fishing activity[4].

The possibility of having an entity such as a coast guard by means of building on existing capabilities (e.g. those of SAN) should also be investigated. South Africa is in the process of establishing a border management agency, which is envisaged to also support some of these functions. SAN should also be seen as a key player in the sector, with a focus on innovations that are technically at the cutting edge in terms of its requirements and which could potentially also support the maritime industry. SAN will determine its innovation needs and will exert considerable influence over the maritime industry in terms of what is required (for example, drones, information systems) to improve safety and security in the maritime sector. Two important issues are securing evidence in a way that will stand up in court, and investigating the opportunities (of which there are many) related to the use of drones and satellites to support safety and security in the maritime sector. Overall, there is also a need for better provision of information to stakeholders, improved uptake of information by stakeholders and transfer of technologies. The economic potential of innovation therefore needs to be explored further.

Action 2: Invest in safety and security training for the maritime sector

Training in maritime safety, inland water safety as well as human, environmental and strategic security should be incorporated into training programmes to be offered by relevant training institutions[24,4]. Such training should highlight the complexity of the issue and include marine environments and inland waterways. Insights from disciplines within the humanities and social sciences, such as anthropology, development studies, international relations, political science, security studies and sociology could also contribute in this regard[2]. An example of an internationally recognised safety-related training course that could be offered in South Africa is the OPITO course, an internationally recognised offshore survival course that looks at safety from an oil and gas skills perspective[10,69]. Such training for cadets needs to be recognised as part of the NQF system.

69 OPITO. 2014. OPITO: Skills for Oil and Gas. Internet: http://www.opito.com/about. Accessed: 29 July 2014.

Action 3: Maintain safety and security standards in the maritime sector

Safety and security standards in the maritime sector need to be maintained through research, innovation and knowledge management. This should be done as follows:

- In terms of safety and security standards (including inland waterways), these need to be reviewed and compared to international standards. The successful implementation of the Cooperative Inland Waterways Safety Programme (CIWSP) would be very valuable in this regard[10].
- An effective knowledge management system needs to be developed and implemented which will support safety and security standards in the sector through better coordination and alignment of processes and procedures between government departments and with the private sector[2].
- South Africa also needs to align its safety and security standards with the IMO's mandate, which is to ensure the safety of shipping and the prevention of marine pollution by ships. The IMO's Safety of Life at Sea Convention (SOLAS) is generally considered to be the most important of all international treaties concerning the safety and security of merchant ships[70].
- There is a need to recapitalise the fishing fleet as 80% of South Africa's fishing boats are 40 years old or older.

Action 4: Capitalise on innovative opportunities for collaboration on safety and security-related matters with other African countries

One of the African Maritime Safety and Security Agency's (AMSSA) research framework objectives is to "identify and accelerate innovative opportunities aimed at harmonised training for Africa maritime administrations and national ports authorities"[71]. At a continental level, the AU has committed itself to strengthening and sustaining inter-agency collaboration to address "maritime challenges and opportunities at national levels as well as enhanced cross-border and sub-regional cooperation…" This commitment is entrenched in the Addis Ababa Declaration of the 2050 AIMS[72]. These regional frameworks and agreements provide an ideal opportunity for South Africa to develop innovative approaches to enable the country to play a key role in regional initiatives. An example of a useful and cutting-edge innovation is the use of drones in a regional context. Drones offer considerable potential, but the relevant legislation that can be used to regulate their use as well as their application in the maritime sector needs to be researched further.

70 International Maritime Organisation (IMO). 2014. *International Convention for the Safety of Life at Sea (SOLAS).* Internet: http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-%28SOLAS%29,-1974.aspx Accessed: 27 June 2014.

71 African Maritime Safety and Security Agency (AMSSA). 2014. *AMSSA 2014 Action Plan*. Internet: http://www.amssa.net/about/action-plan.aspx. Accessed: 26 May 2014.

72 African Union (AU). 2012. *2050 Africa's Integrated Maritime Strategy.* Internet: http://pages.au.int/maritime/documents/2050-aim-strategy-0. Accessed: 26 May 2014.

Safety and security standards in the maritime sector need to be maintained through research, innovation and knowledge management.

Objective 8:

"We have national, regional and international presence and recognition"

Objective 8 differs from the other objectives discussed thus far in that achieving Objectives 1 to 7 will lead to the realisation of Objective 8, which narrowly underpins the vision of the Maritime Road Map.

Having national presence and recognition means:

- Having maritime expertise, skills, innovation and services that are at an internationally recognised standard and significantly contribute to the national GDP[24];
- Being a net exporter of maritime services and skills[24]; and
- Having a maritime sector that is nationally recognised as an asset with financially secure stature[24].

Having regional presence and recognition means:

- Collaborating within SADC regarding coordinated and aligned expansion, marketing, regulation, etc.[24];
- Helping to develop a logistics base for the entire region[24]; and
- Being an active mentor or supporter of other developing maritime economies, particularly in Africa[24].

Having international presence and recognition means[24]:

- Having a presence on the international stage;
- Keeping up with trends and international best practices in the maritime sector;
- Adhering to international standards and giving quality inputs into international policies;
- Having leading and respected global representation on all maritime bodies (e.g. the IMO) and fitting in with IMO guidelines/requirements;
- Improving South Africa's economic diplomacy and international collaboration, including the promotion of South Africa's maritime strategy;
- Being able to influence international trade preferences, routes and relationships beyond the country's EEZ;
- Fully embracing South Africa's responsibility with regard to ocean governance (by, for instance, having the infrastructure in place to participate in search and rescue activities);
- Being a global contributor to research and innovation;
- Being an internationally preferred port of call (for infrastructure, shipping services and ship building); and
- Having organisational structures in place in the country's maritime sector similar to those of other maritime nations in order to facilitate direct international communication.

LINKAGES BETWEEN THE MARITIME ROAD MAP AND PHAKISA: OCEANS ECONOMY

6 LINKAGES BETWEEN THE MARITIME ROAD MAP AND PHAKISA: OCEANS ECONOMY

Objective 1:

"We have a maritime culture and recognise and learn from our maritime history"

Phakisa: Oceans Economy has in place several elements that support this objective. The Maritime Road Map action "fostering national maritime pride", in particular, links to the various tourism initiatives under Phakisa. A case in point is the intensive six week Coastal and Marine Tourism Lab that recently took place and at which various possible tourism initiatives where discussed, including a coastal heritage route featuring ship wrecks[15]. Fostering national maritime pride also links to initiative No. 18 under Phakisa: Oceans Economy's Marine Transport and Manufacturing (MTM) focus area. This initiative is about getting more South African registered vessels[73,74] and more well trained South African deckhands on the water (as per Phakisa's MTM initiative No. 18). Maritime pride is also fostered by building South Africa's marine manufacturing and pollution combating capabilities, and by communicating the progress made under Phakisa: Oceans Economy through public events and marketing[15,74].

Objective 2:

"We have an enabling governance framework for the maritime sector"

Phakisa: Oceans Economy is pursuing a number of initiatives that align with this objective. In terms of legislative review, for example, there is a commitment to enhance the Integrated Coastal and Oceans Management Act or Oceans Act (Phakisa's MPSG initiative No. 1)[27].

In terms of new legislation being introduced, several developments are currently taking place. For example, the Draft Marine Spatial Planning Bill was recently approved by Cabinet for public comment. In addition, a draft National Framework for Marine Spatial Planning has been completed in order to designate the ocean for specific use and avoid user conflict[74].

In terms of the alignment and coordination of existing legislation in the maritime sector, an example of progress made under Phakisa: Oceans Economy is that aquaculture authorisations have been streamlined to shorten the timeframes for approvals. In addition, the security cluster has established an inter-departmental technical working group to align all security operations in the maritime environment[74].

In terms of institutional reforms, an important development that has taken place as part of Phakisa: Oceans Economy has been the shifting of the Petroleum Agency South Africa (PASA) from the Department of Energy (DoE) to the Department of Mineral Resources (DMR)[15].

Finally, in terms of strengthening relations with Africa and other countries, this is an important topic area for Phakisa: Oceans Economy. Examples of current initiatives and plans include South Africa's aspiration to chair IORA from 2017, and the close ties it has been forging with the BRICS cluster, as well as other key maritime nations such as Norway[15].

Objective 3:

"We have an efficient system of coordination, collaboration and knowledge sharing and have taken measures to reduce red tape in order to promote investment and development"

Phakisa: Oceans Economy has to so some extent addressed the need for a coordinating body for the maritime sector. The Phakisa Unit within DPME is responsible for leading Phakisa: Oceans Economy and for the monitoring and evaluation of plans. DEA through the Oceans Economy Secretariat coordinates, promotes and assists with the implementation of the Phakisa: Oceans Economy plans[6].

Furthermore, Phakisa: Oceans Economy follows an inclusive approach and has adopted an efficient governance structure to ensure and improve collaboration, knowledge sharing, implementation monitoring and prompt issue resolution[6].

73 To date tow bulk carrier vessels and a tanker have been registered on the South African ships register and are flying the South African flag[74].

74 Operation Phakisa. 2016c. *Operation Phakisa Advertorial* published in The Star on 11 April 2016.

Phakisa: Oceans Economy is also very focused on reducing bureaucratic red tape and speeding up processes. In order to do so, ministers meet regularly and work closely with the Phakisa unit within DPME and DEA's Oceans Secretariat. An example of a process that has been expedited is the environmental authorisation process for the Aquaculture focus area. DEA is also in the process of conducting strategic environmental assessments (SEAs) for the entire country for both the Aquaculture and Offshore Oil and Gas Exploration focus areas[15].

In terms of strengthening the links between schools, HEIs and industry in the maritime sector, DHET has started a process including DIRCO and the Department of Home Affairs (DHA) to coordinate and leverage international skills and artisanal opportunities[3]. Another example of industry and HEIs as well as other research organisations working together is SAMREF[75].

Objective 4:

"We utilise our resources sustainably and protect our natural resources in the EEZ"

Phakisa: Oceans Economy has a number of initiatives in place to reduce levels of pollution at sea. A pre-emergency planning and response in respect of oil spill emergencies has been completed. International Oil Pollution Compensation (IOPC) Funds[76] negotiations have also been concluded. This includes the processing of outstanding payments, and the preparation of submission reports[74]. Furthermore, concrete plans are in place to enhance the environmental governance capacity of the oil and gas industry (Phakisa Offshore Oil and Gas Exploration initiative No. E2)[74].

In terms of conserving marine resources, initiative No. 7 under Phakisa: Oceans Economy's MPSG focus area deals with setting up a national ocean and coastal water quality monitoring programme[27]. As part of the same Phakisa: Oceans Economy focus area, regulations and declaration notices have now been completed for the establishment of 22 MPAs[74].

Objective 5:

"We have a relevant and well-functioning knowledge management system, targeted R&D and technology; a strong and 'coherent' education system; and a role for the humanities and social sciences in the maritime sector"

With relevance to this objective, Phakisa: Oceans Economy supports skills development and capacity building in the maritime sector. The initiative also focuses on maximising the value of the human resources and expertise within the oceans economy sector[3].

In terms of the need to maintain a balance between academic qualifications and practical experience in the maritime sector, reference can be made to SAIMI, which runs all of the skills development working groups within Phakisa: Oceans Economy[3]. Linked to this is the need to promote internships/apprenticeships and mentorships in the maritime sector. A number of Phakisa: Oceans Economy initiatives are currently running in this regard. An example is the aim to train 2550 technical vocational education and training (TVET) college graduates on an 18 month workplace-based experiential learner programme in scarce and critical trades over the next 5 years (Phakisa's MTM initiative No. 9). Another example is the aim to train 18 172 learners as artisans, semi-skilled workers and professionals over the next 5 years (Phakisa's MTM initiative No. 12)[6].

While research and development is not the main focus of Phakisa: Oceans Economy, some of its initiatives do deal with this. An example is the plan to exploit broader research opportunities presented by offshore oil and gas exploration (Phakisa Oil and Gas initiative, No. B3), which links to SAMREF. In addition, the MPSG focus area features an MPA/marine spatial planning (MSP) discovery, research and monitoring programme (MPSG initiative No. 9)[6].

Also linked to the MPSG focus area, the Nelson Mandela Metropolitan University (NMMU) has established the Fisheries Law Enforcement Academy, with a specific focus

75 Department of Science and Technology (DST). 2016. *Minister Naledi Pandor Launches Marine Research and Exploration Forum*. Internet: http://www.gov.za/speeches/minister-naledi-pandor-launches-marine-research-and-exploration-forum-29-jan-2016-0000 Accessed: 20 May 2016.

76 The IOPC Funds provide financial compensation for oil pollution damage that occurs in Member States, resulting from spills of persistent oil from tankers.

77 Dugmore, H. 2016. *Tackling Crime on High Seas. The Star*, 18 May 2016. Internet: https://news.nmmu.ac.za/news/media/Store/documents/2016/Heather-Dugmore-Tackling-crime-on-high-seas.pdf Accessed: 20 May 2016.

on addressing international sea fisheries crime. The academy will focus on presenting a balance between theoretical and practical training, and will cover the South and East Coast States of Africa, with a view to extending its coverage to the Indian Ocean rim. The academy will also pull in international expertise, counts Norway as a partner, and has partners across the AU. This ties in with the Maritime Road Map action of making South African maritime education and skills training facilities internationally renowned and relevant[77].

Objective 6:

"We have structured financing of initiatives in the sector and sustained maritime economic growth"

Job creation and scarce skills are of course key elements of the Phakisa: Oceans Economy process. Examples include investments small-scale fisheries, aquaculture, catalytic economic initiatives and port development (small harbours)[3]. If Phakisa manages to implement its planned initiatives, this will contribute to the sustainable livelihoods of communities, one of the actions mentioned in the Maritime Road Map. Phakisa: Oceans Economy also has major economic initiatives and investments in ports. As part of this process, over R 7 billion has been committed by the Transnet National Ports Authority (TNPA) to ensure that South Africa's ports have the infrastructure to capitalise on the substantial economic benefits presented by the oceans economy. In addition, South Africa is expanding its capabilities for oil/gas rig repair and maintenance from the current four rigs that are being serviced per year. In this regard, specialised infrastructure is currently being developed through a PPP model[74].

Objective 7:

"We prioritise safety and security and military protection within and beyond our EEZ"

Phakisa: Oceans Economy features a number of initiatives that link to the prioritisation of safety and security and military protection within and beyond South Africa's EEZ. A key example is Operation Fiela that was run in the coastal areas of the Northern Cape and Eastern Cape in November 2015 and resulted in:

- 21 fines being issued for illegal fishing;
- 1 519 units of abalone being confiscated;
- One container of counterfeit timber products worth R12 million being confiscated;
- One container of tobacco products worth R3 million being confiscated;
- 20 bags of teak being confiscated; and
- A number of arrests of illegal migrants and suspected smugglers being made.

Also, as previously mentioned, efforts are being made to align all security operations in the South African maritime environments, and an EEZ maritime security plan is being developed[74]).

Objective 8:

"We have national, regional and international presence and recognition"

As already mentioned, Phakisa: Oceans Economy places considerable emphasis on fostering relationships with regional and international partners on a broad range of maritime-related matters. The successful implementation of the numerous initiatives that form part of the Phakisa: Oceans Economy focus areas will establish and strengthen South Africa's position in the international maritime space.

IMPLEMENTATION OF THE MARITIME ROAD MAP AND ACKNOWLEDGEMENTS

7 IMPLEMENTATION OF THE MARITIME ROAD MAP

Having established some of the linkages between the Maritime Road Map and Phakisa: Oceans Economy, it is clear that the two processes are well aligned, although the former, by design, focuses considerably more on research, innovation and knowledge management than the latter.

With its specific focus, the Maritime Road Map has the potential to strengthen and support the Phakisa: Oceans Economy process, by encouraging more in-depth investigations into many of the important decisions that have to be made in the respective focus areas. In terms of Phakisa: Oceans Economy there are certain areas that require operational urgency and others where it is important to slow down and find sound enough answers before moving forward. At the same time, it is important, however, to conduct the required research as thoroughly yet efficiently as possible, so that it can effectively support the implementation that is already underway as part of the Phakisa process.

It is therefore important for SAMSA, the main funder of this Maritime Road Map, to find an "owner" for this initiative. This could be SAMSA or SAIMI or another key actor within the South African maritime sector. Subsequently, a stakeholder process needs to be run to make the Maritime Road Map "actionable". This involves further unpacking each of the actions into actionable sub-items with responsible parties, timelines and budgets linked to them (much like the Phakisa: Oceans Economy planning process was run). Once unpacked, agreed upon and finalised, the actionable items could become cabinet memos, and adopted as a Medium Term Expenditure Framework (MTEF) line item. Implementing the Maritime Road Map will require a coordinated, structured effort by leaders in the maritime sector and the continued support and participation of stakeholders throughout the sector.

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APPENDIX 1

Snapshot of current opportunities as identified by stakeholders in the maritime sector.

Knowledge management	R&D, Technology and Innovation	Education and skills development
National Science and Technology Forum (NSTF)[78]: This is a stakeholder forum that focuses on communication around science, engineering, technology and innovation (SETI) policy issues, and presents good networking opportunities for members of the maritime sector.	**Marine Science Platform (DST):** The Marine Sciences Platform under DST provides a policy platform for the maintenance of marine and oceanic research and human capital development through the provision of resources.	**Heritage Beaches project:** This project presents an opportunity to develop maritime archaeology related skills among young people[79].
OceanSAfrica[80]: The OceanSAfrica initiative is designed to take existing oceanography research and pre-operational outputs, routinely place them in the public domain in a highly accessible format, and demonstrate direct benefit to key societal stakeholders through the provision of tailored information for environmental decision making in the marine and freshwater domains.	**The South African Environmental Observation Network (SAEON):** The Egagasini Node in particular houses a number of long- term observation and modelling research programmes over a range of disciplines from offshore marine protected areas to benthic biodiversity and physical oceanography in the offshore and coastal environments . The Elwandle Coastal Node, which established the Algoa Bay Sentinel Site, plans to replicate Long Term Ecological Research (LTER) sentinel sites around the coast of South Africa, the sub-Antarctic Islands and Antarctica[56].	**SAMSA:** SAMSA runs various initiatives such as providing post-graduate students with the opportunity to study at the World Maritime University (WMU) and subsidising the salaries of experts to teach at the Cape Peninsula University of Technology (CPUT)[4].
The National Earth Observation and Space Secretariat (NEOSS)[81]: NEOSS aims to coordinate and expand activities related to earth observation and space matters.	**Acoustic Tracking Array Platform (ATAP) (DST):** ATAP is a collaborative marine science programme which monitors the movements and migrations of inshore marine animals.	
The South African Environmental Observation Network (SAEON): Projects are run in collaboration with international and national research institutes and HEIs as well as government departments and the oil and gas industry. All data is freely available via the SAEON data portal.	**Antarctic Research Strategy for South Africa[82,83] (ARESSA) which falls under the South African National Antarctic Programme (SANAP):** ARESSA focuses on promoting fundamental research and linking basic research to applied knowledge, increasing human capital, developing R&D and establishing closer links with industry[82].	

78 National Science and Technology Forum (NSTF). 2014. Internet: http://www.nstf.org.za/nstfWebPortal/appmanager/nstfWeb/nstf;jsessionid=R4pjTYJGmG217RRk1X92G5422zCN2WFxG2PpMB4mBcPcdq1WYN5L!-1244248596?_nfpb=true&_pageLabel=nstf_portal_page_4. Accessed: 30 July 2014.

79 Maitland, V. 2013. *HerBe Programme: A Public Maritime Archaeology Programme. Heritage Beaches: Gateway to the Maritime Industry.* Presentation at the Integrated Marine and Maritime Technologies Workshop, 30 October 2013, Pretoria.

80 Krug, M., Backeberg, B. and Bernard, S. 2013. *Towards a Sea-state Monitoring System for South Africa: the OceanSAfrica Initiative.* Presentation at the Integrated Marine and Maritime Technologies Workshop, 30 October 2013, Pretoria.

81 Council for Scientific and Industrial Research (CSIR). 2012. *NEOSS Rallies Earth Observations Community for SA-GEO Workshop*. Internet: http://www.csir.co.za/enews/2012_july/05.html. Accessed: 30 July 2014.

82 Siko, G. 2013. *Towards Advancing Marine and Antarctic Sciences*. Keynote presentation at the Integrated Marine and Maritime Thought-Leaders Indaba, 31 October 2013, Farm Inn, Pretoria.

83 Currently, 26 projects are running under the ARESSA – National Research Foundation (NRF) grant system. They run in the following areas:

- Geoscience, Archaeology and heritage;
- Marine mammals, sea birds and biodiversity;
- Space science and engineering;
- Microbiology and genetics; and
- Oceanography and marine science[82].

Knowledge management	R&D, Technology and Innovation	Education and skills development
South Africa International Maritime Institute (SAIMI): SAIMI, which is funded by DHET, was established to coordinate all skills and capacity building activities for Phakisa: Oceans Economy[10].	**Socio-Economic Partnerships Programme (DST):** This programme enhances the growth and development priorities of government through targeted science and technology interventions and the development of strategic partnerships with other government departments, industry, research institutions and communities[84].	
	African Coelacanth Ecosystem Programme (ACEP) (DST): ACEP houses five multi-disciplinary and multi-institutional research projects.	
	Mandela Bay Composites Cluster (MBCC): This cluster presents an opportunity to utilise various R&D and manufacturing capabilities for building a national base for the development of the composite industry[10].	
	Centre for High Performance Computing (CHPC): The CHPC aims to provide world-class high performance computing that enables cutting-edge research with high impact on the South African economy and enables South Africa to become globally competitive through the effective application of high-end cyber-infrastructure[85].	
	South African Marine Research and Exploration Forum (SAMREF) (DST): SAMREF was recently launched to facilitate new collaborative offshore studies in order to increase knowledge about the offshore marine environment related to renewable energy potential, marine biodiversity and ecology, climate change and ecosystem functioning amongst others[10].	

84 Patel, I. 2013. *DST's Socio-economic Partnerships Programme.* Keynote presentation at the Integrated Marine and Maritime Technologies Workshop, 30 October 2013, Farm Inn, Pretoria.

85 Centre for High Performance Computing (CHPC). 2014. Internet: http://www.chpc.ac.za/index.php/about-us/mission-objectives. Accessed: 30 July 2014.

APPENDIX 2

Examples of Scarce and Critical Maritime Skills[4].

Sub-sector	Critical Skills	SETAs
Shipping, Ports and Logistics	• Navigation Officers • Engineers • Engine and Deck Ratings • Hydrographers • Oceanographers • Maritime Technologists • Marine Ecologists • Meteorologists • Fire-fighters • Transport and Logistics Management • Maritime Project Management • Vessel Traffic Management • Sea-watch and Rescue Operators	• TETA • MERSETA • BANKSETA • FASSET • THETA
Offshore Oil and Gas	• Geologists/Geophysicists • Engineers (Chemical Engineers • Geotechnical • Drilling • Structural • Marine • Mechanical) • Deck Officers • Artisans	• TETA • CHIETA • FOODBEV • HWSETA • INSETA • ISETT • MERSETA • MQA
Fisheries and Aquaculture	• Aquatic Health or Aquaculture • Deck Officers • Marine Engineers • Artisans • Ratings • Engine	• TETA • AGRISETA • BANKSETA • FASSET • FOODBEV • THETA • W&RSETA
Vessel Construction and Repairs	• Naval Architects • Production Managers • Designers • Electricians • Electronics • Metal Fabricators • Boiler Makers and Welders • Riggers • Technicians	• TETA • MERSETA • INSETA
Commercial Services	• Marine Attorneys/Lawyers • Marine and Environmental Lawyers • Maritime Economists • Marine Financiers/Underwriters • Maritime Consultants • Crewing • Training • Research and Innovation • Business	• TETA • MERSETA • INSETA • BANKSETA
Marine Tourism	• Hospitality Officers (Chefs, Stewards etc.) • Marine Conservation Officers • Dive Videographers/ Photographers	• TETA • MERSETA • CATHSSETA • W&RSETA
Safety, Security and Defence	• Security • Defence Personnel • Inspectors • Lawyers • Quality Professionals	• SASSETA • TETA

NOTES

NOTES

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