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The Path to Research Leadership in Africa Report

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Vitae is the global leader in supporting the professional development of researchers, experienced in working with institutions as they strive for research excellence, innovation and impact.

About us: We are a non-profit programme, part of the Careers Research & Advisory Centre (CRAC) Ltd, with over 50 years' experience of enhancing the skills of researchers. We strengthen our members' institutional provision for the professional development of researchers through research and innovation, training and resources, events, consultancy and membership.

Vitae has four aims:

- Influence the development and implementation of effective policy relating to researcher development
- Enhance higher education provision to train and develop researchers
- Empower researchers to make an impact on their careers
- Evidence the impact of professional and career development support for researchers Our partners include governments, funders of research, academies, professional bodies, trusts and foundations, universities and research institutes

CRAC provides research intelligence and innovation for all those who support career development for people of all ages and in all sectors. We work in partnership with government agencies, education organisations and providers, and employers and professional bodies.

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1. Context, aims and approach

1.1 Context

The Wellcome Trust (Wellcome) and the African Academy of Sciences (AAS) through its AESA initiative jointly commissioned this research to explore the landscape of research leadership and associated training programmes available across Africa and make recommendations to all stakeholders on how they can play their part in developing the next generation and building the capacity and capability of current African research leaders.

Wellcome is a politically and financially independent foundation that supports researchers, takes on big health challenges, campaigns for better science, and helps everyone get involved with science and health research.

The AAS is a non-aligned, non-political, not-for-profit pan-African organisation whose vision is to see transformed lives on the African continent through science. The Alliance for Accelerating Excellence in Science in Africa (AESA) is an initiative of AAS and the New Partnership for Africa's Development (NEPAD) Agency. AESA's mission is to catalyse investments, strategies and programmes that promote the brightest minds in Africa, foster scientific excellence, inspire research leadership and accelerate innovation in ways that will improve lives and shift the centre of gravity for African science to Africa.

Theories of leadership and models of leadership capacity-building have been developed primarily in high-income contexts, with comparatively little research on leadership in low-income countries. Studies of African researchers and research leaders[i] suggest a number of challenges leading to poor conceptualisation and delivery of research leadership development by institutions. Such challenges include a lack of clarity on:

- the type of leadership development appropriate to researchers in Africa, ensuring it is culturally and contextually relevant
- effective delivery mechanisms (e.g. use of training providers, secondment opportunities, comparative costs).

1.2 Aims and scope

Wellcome and AESA's aim for the project was to support the capacity-building capabilities for researchers within the African continent, with institutions able to use the recommendations to benchmark future leadership development opportunities, such as secondments and mentorships, for their researchers and provide first-class training.

This scoping study was tasked with identifying:

- the skills required to be a successful research leader
- the current landscape of major leadership training programmes across Africa
- the successes and challenges of developing the capacity of individuals
- potential benefits from a comprehensive approach to leadership programmes
- obstacles and risks to comprehensive leadership programmes, including funding issues
- scope of potential investment in comprehensive leadership training

- the nature and range of inputs which would deliver beneficial outcomes.

Our objectives were to:

- identify important research leaders across Africa; determine the characteristics that make them a successful leader; and understand how their environment/context has impacted on their success
- determine the core competencies, skills and experiences required to be a successful research leader in Africa
- map the current landscape of leadership training/development options available for research organisations
- provide recommendations on how institutions can best support the leadership development of their researchers going forward.

The project deliverables include a presentation of findings to a group of funders and selected representatives from low- and middle-income countries' (LMIC) institutions in relevant African countries, accompanied by a project summary document (appendix A).

1.3 Approach

We undertook a mixed method, triangulation approach to capture and synthesise a range of perspectives. Our leadership paradigm was based a conception of research leadership as a continuous learning journey on a path with defined stages and transition points: early career (research students and postdoctoral researchers); mid-career (leading a research team) and senior (leading large teams or organisations).

The inception phase enabled us to finalise our analytical framework to:

- include a range of institutional research contexts by sampling in several countries and including universities and research institutes in qualitative research
- explore underpinning structures and stages of the path to leadership to enable participants and organisations to maximise gain from leadership development at different career stages
- examine elements of institutional support such as research management, mentoring and coaching, action learning, recognition and promotion
- seek to identify characteristics and competencies of research leaders appropriate to different leadership stages
- consider the gender dimension in the path to research leadership in Africa.

Qualitative interviews and focus groups were complemented by a quantitative-based survey. A team of expert consultants in Southern, East and West Africa conducted the interviews and focus groups. The results of the interviews, focus groups and survey built on findings from the literature review of research leadership in Africa and a web search of current leadership training and development opportunities for research leaders.

1.3.1 Design of research tools

In designing our research tools we chose to use a research leadership model – the Vitae Researcher Development Framework (RDF); specifically, its 'leadership lens' – that is based on building competencies through a series of development phases (appendix B). Developed

in the UK[ii], the RDF model has been used successfully in a range of international contexts. It was tested for applicability for this project with a pilot focus group of DELTAS research leaders (1.3.3). The RDF was then used in all parts of data gathering: interviews, focus groups and survey.

When designing the survey, in addition to questions based on the RDF, we used leadership themes and components derived from the DELTAS pilot focus group. Through analysis of the results of these complementary approaches we have developed a potential model for research leadership geared to African needs and priorities.

1.3.2 Participants

Our approach sampled the views of a range of stakeholders - research leaders, early and middle career researchers, research managers, senior management and funders. The researchers all worked in the health sciences, and were largely from institutions in East, West and Southern Africa. A small number of survey respondents were based in North Africa. Most participants were based in Anglophone regions.

In identifying successful research leaders for interview, we used the definition 'research leaders who are established in their research field, running large research groups, leading large research teams and/or managing large research facilities'. These included, for example, AAS Fellows and/or other National Academy Fellows and DELTAS consortia research leaders.

Focus group participants (early and mid-career researchers and research managers) were identified through local project team networks in Cote d'Ivoire, Uganda, South Africa and Ghana.

Research students as well as researchers, research leaders and research managers were invited to participate in the survey through the networks of the local experts in each participating country, as well as research and innovation management associations across Africa.

1.3.3 Project outline

Project phases were as follows:

i. Inception and research design including:
- pilot focus group at the DELTAS Annual Conference in Johannesburg in 2018 with 11 senior research leaders, directors and funders to elicit themes and question areas
- use and validation at the pilot focus group of the Vitae Researcher Development Framework leadership competencies (appendix B)
- design of interview, focus group and survey questions drawing on the above

ii. Data gathering
- Literature search to understand the range of perceptions and research about 'successful research leadership' in Africa
- 24 semi-structured one-hour interviews with selected successful research leaders in eight African countries, by local in-country expert interviewers
- 27 participants across four focus groups (Cote d'Ivoire, Ghana, South Africa and Uganda) with local in-country expert facilitators

- Survey of the views of those in research-related roles in Africa, including research students, researchers, research leaders and research managers: target response 250
- Desk-based research into current leadership training and development programmes run by external (non-institutional) providers

iii. Analysis
- Synthesis of findings to develop and recommend potential models/frameworks for the development of the research leadership path in Africa
- Creation of case studies of existing leadership provision in Africa that illustrate alignment of provision to researchers' leadership development needs
- Note areas for further study

iv. Presentation of project, key findings and recommendations to the DELTAS Annual Conference in Dakar in 2019

v. Final report, further outputs and next steps, including:
- reporting on potential implementation routes for recommended models
- developing at least three peer reviewed publications as per Wellcome's open access guidelines.[iii]

1.3.4 Data-gathering mapped to project aims

Table 1 summarises how each element of the data-gathering phase contributed to project objectives

Table 1 Matrix showing contribution of each research strand to project objectives

	Determining characteristics of successful research leaders	How environment/ context impact on success	Core competencies and experiences required	Current landscape of leadership training & development
Pilot focus group with DELTAS research leaders	x	x	x	
Literature review of research leadership in Africa	x	x	x	x
Interviews with successful research leaders	x	x	x	x
Researcher focus groups	x	x	x	
Survey of those in research-related roles in Africa	x	x	x	x
Mapping the landscape of leadership training programmes			x	x

Further detail on our approach is given in appendix C, including: sampling design, participants and ethical clearance; and design and content of interviews, focus groups and survey.

2. Current research leadership landscape

2.1 The African research landscape

Researchers are a scarce resource in Africa. According to UNESCO[iv], the global average of researchers per million inhabitants is 1,478 (2015): in Africa, only Tunisia (2000 researchers) exceeds the average. Below the average, Morocco is closest (1,100) followed by Egypt (680), Senegal (550) and South Africa (494). In multiple countries in sub-Saharan Africa (SSA), the average is fewer than 50 researchers per million inhabitants.

Participants in our study were very largely based in SSA, and we therefore focus in this section on data[v] to contextualise the experiences that they report through the interviews, focus groups and survey. Although we are concerned with researchers in the health sciences, an overview of research infrastructure across the piece is relevant for an appreciation of the institutional and national issues that impact on improving the path to research leadership in these disciplines.

Research infrastructure across much of SSA is underdeveloped. The African Union has set a target of 1% GDP investment in research (world average 1.68%, 2014). Data suggests that in SSA only South Africa, Kenya and Senegal are nearing the target; each currently invests around 0.8%. Most higher education (HE) institutions prioritise teaching: HE expansion has generally focused on undergraduate and master's levels rather than doctorates.

Despite these resource challenges, SSA share of the global output in research papers increased from 0.44% in 2003 to 0.72% in 2012. Health sciences have the largest share in all sub-regions except South Africa. International collaboration accounts for most of the research output (for example, over 60% in East Africa and Southern Africa). Intra-regional collaboration between researchers of African countries accounted for below 15%, thus indicating that networked communities of African academics are still exceptional.

An increase in PhD enrolments seen in some countries is being driven by government policies to raise qualification levels in the HE workforce. Such policies are operating at different speeds. For example, in Ethiopia, where only 8% of HE staff were PhD-qualified, PhD enrolments as a proportion of all HE enrolments has risen to almost 8%. In South Africa, Ghana and Kenya, in contrast, PhD enrolments form less than 2% of total enrolments. In these countries, PhD-qualified personnel range from 31% in Ghana to 43% in South Africa.

2016 UNESCO data indicates that only a quarter of academic staff in tertiary education across sub-Saharan Africa are women[vi]. There is considerable variation between countries in SSA, from 37% in Botswana to less than 10% in many. Gender equity is hampered by cultural expectations and lack of governmental and institutional support. Senegal is one exception, where the government's PAPES programme to support women researchers and researcher-teachers includes funding to help women complete doctoral research[vii]. The South African government has also supported women researchers with a competitive research chairs programme targeting women scientists[viii].

PhD provision tends to be concentrated in a small number of elite universities, normally the best resourced institutions with access to international/donor networks. In the policies for,

and allocation of, government funding for research capacity-building there appears to be a frequent tension between improving efficiency and improving equity.

The great majority of doctoral candidates in SSA are mature students already working in academia or the public sector. Master's to PhD conversion rates are low. Most doctoral candidates are self-funded. Government grant support is at low levels in most countries. Drop-out rates are high and time to completion relatively long. However, those that graduate do tend to remain in academia: there is little attrition to industry.

SSA's doctoral model largely follows the European 'research apprentice' model. Typical challenges reported by early career researchers (ECRs) include: lack of finance for doctoral summer schools and international conferences; finding a suitable supervisor with relevant experience; and frequency and quality of supervisory meetings – thus highlighting a need for supervisory skills training. Doctoral training includes use of visiting scholars to provide intensive blocks of research training, perhaps especially so where rising enrolments outstrip supervisory capacity.

International collaborations to build research and researcher capacity have traditionally been South-North models (including for example academic exchanges and doctoral training for African researchers situated in the global North). South-South collaborations are still rare. Notable examples include The Consortium for Advanced Research Training in Africa (CARTA, see 2.3), which has somewhat broadened from an original focus on public health disciplines, and the pan-discipline African Doctoral Academy PhD training hub based at Stellenbosch University in South Africa, funded by the Carnegie Corporation.

2.2 Characteristics of research leadership and the African context

Our literature review of research leadership in Africa (appendix D) provided insights into leadership styles, expected competencies of research leaders, the gendered perspectives of research leadership and the experiences of early career researchers from Africa. Key points are summarised here.

2.2.1 What does research leadership look like?

Research leadership goes beyond generic leadership concerns (such as with vision and strategy) to encompass issues specific to the research ecosystem; for example, building linkages with policy makers, being an effective ambassador for science, and engaging with other communities to influence research and its resourcing. Strong leadership will catalyse researchers, teams and organisations to be more successful.

Top research leaders are at the forefront of their field in terms of publication quality and number, attract large research grants, supervise and mentor graduate students and successfully implement large-scale research programmes. They are further distinguished by translating their research findings into outputs that benefit communities and other stakeholders, such as policy that addresses real world challenges or intellectual property developed into products and services. At the highest levels, research leaders play a central role in influencing, transforming and strengthening institutional, national and international research systems.

In the global research system, there is large consensus on what top research leaders do. How they achieve this, however, may be context dependent. As stated in 1.1, the dominant

leadership models have evolved in high-income contexts; only relatively recently have studies begun to explore their relevance in African ones.

2.2.2 Perspectives and styles of leadership

In Africa, little evidence exists on the styles and perspectives of leadership within research contexts. Research leadership requires particular competencies beyond the generic. However, most of the themes from mainstream leadership studies can be extrapolated to the context of research leadership.

It cannot be assumed that leadership as perceived in the global North is applicable in Africa. Cultural influences in leadership styles and preferences impact leadership in Africa, and so consideration of leadership pathways includes existing cultural beliefs and practices.

Common or most admired styles of leadership in Africa are value-based, team-orientated and participative. Consultative leadership that pursues public or communal goals gains wide approval. Charismatic, aspirational or visionary leadership and a sense of patriotism feature strongly in these characterisations. Pursuing goals related to community service and not self-serving is seen to require self-awareness of leadership capacities and a relations-oriented style of leadership.

Some researchers go further to suggest that African leadership is conceptualised differently; that it is communally constructed rather than focused on the individual. In this view, concentrating on styles, attributes and behaviours of the research leader results in an imbalanced understanding of leadership in the real sense, undermining the communal/collective roles played in decision making. Such leadership applies communal goals with transparency and accountability; combining different skills and knowledge.

Findings from a survey of African research leaders and team members suggests, however, that leadership that is communally constructed, manifesting highly democratic/collective decision-making, may not resonate greatly in the sector. The most favoured leadership style was found to be relations-oriented rather than democratic/participative. In relations-oriented leadership, the leader's focus on building relationships is central to individual and team performance. Consultation is important, but the individual leader is responsible for decision-making. Other leadership styles found by the same study to be less favoured were paternalistic leadership, laissez-faire leadership and task-orientated leadership.

The nature of successful research leaders' interactions would be explored in our interviews to help further understand the most favoured leadership styles in the African academic research context.

2.2.3 Research leadership gender dynamics

Leadership in research is a challenge for women in Africa. Issues include: underrepresentation in leadership positions as a result of institutional policies and practices which limit opportunities; challenges around academic promotion or progression; the delay in attaining postgraduate qualifications, especially a PhD; discriminatory practices; gendered processes; exclusion from career development opportunities; prejudice about academic abilities and intellectual authority; and 'gender-insensitive pedagogical processes'.

Discrimination is typically clandestine, abstract and/or intangible. Gender imbalance is especially common in the more competitive faculties and departments (for example, in

STEM disciplines). Women's 'transferable skill' management characteristics enable increased capacity to influence managerial/administrative decisions but are not important or valued in a competitive management culture focused on research output.

In negotiating these systemic issues, women academic leaders regard listening, good verbal and written skills, decisiveness, the ability to empower others, and collaboration as critical to function effectively as academic and managerial leaders. Role models and mentor-mentee relationships enable women to develop knowledge and skills for leadership, including navigation of gender barriers in relation to leadership roles

2.2.4 Research leadership characteristics and competencies

The review was only able to identify three publications that consider the characteristics of African research leaders. We have mapped their key findings onto the RDF leadership competencies (table 2), which describe leadership competencies in terms of leadership of self, leadership of others, and leadership of research excellence.

Table 2 Competencies, behaviours and qualities of research leaders and leaders in Africa identified in the literature review mapped to the Vitae Researcher Development Framework (RDF)

RDF	Literature review*
Leadership of self	
Responsibility	Strategic thinker, accountable to the people they lead, multilingual, English proficiency
Self-reflection	Self-awareness, ambitious and tenacious, goal-oriented, globally minded
Reputation & esteem	Strong sense of integrity, being an expert in your field
Enthusiasm	Love of subject, enthusiastic, sense of anticipation
Leadership of others	
Influence & leadership	Aspirational or visionary leadership, Interpersonal skills, just, compassionate, transparent, open-minded
Public engagement	Communication skills, embraces publicity and visibility, for the common good
Policy engagement	Ability to translate research results into policy, sense of patriotism, oriented towards social justice and human rights
Team working	Team skills, collaboration and networks, care for people, respectful towards diversity, for the common good
Mentoring	Develop young leaders, share knowledge and experiences with the young or entire community, supervision
Leadership of research excellence	
Subject knowledge	Authority in subject, ethical research conduct, competent, problem solving, being an expert in your field
Income funding & generation	Winning grants applications
Publication	
Infrastructures & resources	Technologically savvy
Preparation & prioritisation	Knowledgeable in research methodology, time management skills
Project planning	Delivering outputs on time
Evaluating	Critical thinking skills

* (Curry et al., 2012; E. K. Niemczyk, 2018; Owusu et al., 2017).

The outcomes confirm that Africa research leadership can be considered a combination of leading self, leading others and leading research excellence. Of particular note is the section

on leading others, which highlights the leadership responsibilities for developing the next generation, ensuring diversity, and the common good. This maps closely to the relational style of leadership identified above (2.2.2).

2.3 Research leadership training provision

Our mapping of current provision for African research leaders suggests that, when considered against the leadership characteristics and competencies discussed above, there are significant gaps in the conceptualisation and availability of research leadership training.

Here we consider training and development programmes designed and delivered by external providers. Information about institutional training provision is indicated in sections (3.1.9) and (3.4.7). Overall, we found that external programmes focused largely on leadership of research or on generic leadership/management skills, rather than both, and that availability is highly limited (appendix E illustrates further). A lack of programmes geared to the needs of current and future African research leaders mirrors the picture of provision for leaders across higher education in general noted by, for example, Education Sub Saharan Africa[ix] (ESSA).

2.3.1 Focus on research expertise and research development

Programmes that are specifically for research leadership development tend to be focused on research advancement and technical skills with less attention to transferable skill areas such as communication or people management. For example, the Consortium for Advanced Research Training in Africa (CARTA) programme develops research-specific key skills such as critical thinking, data management and data presentation, alongside some professional development.

2.3.2 Programmes focused on leadership skills but not research

Across the African continent there are several examples of organisations that offer individual leadership development, such as the Centre for Creative Leadership and the Centre for African Leadership. However, these are aimed broadly at business and public sectors, not contextualised for academia. Some programmes that focus on the public sector may be more relevant. PWC, for example, offers leadership development and consultancy for top team management which may be relevant to senior research leaders, but these programmes are costly.

2.3.3 Leadership programmes for women

We found few examples of programmes designed for women leaders, and none for women working in academia. One was the Women in Leadership event from the Centre for International Development and Training (CIDT, University of Wolverhampton, UK), designed to ‘address the unique challenges women face in leadership positions and to create enabling conditions to address them’.

2.3.4 Global leadership development organisations

Some relevant leadership development approaches stem from global initiatives, such as the Global Young Academy (GYA), featured in the box below. This organisation’s national groups include African countries and it has pan-African initiatives, notably the African Science Leadership Programme (ASLP)[x]. Such opportunities are highly competitive and extremely limited in reach across the African researcher population. For recruitment to the latest round of ASLP, 650 applications were received in relation to 20 places[xi].

The Global Young Academy: example of a holistic research leadership approach

One initiative that focuses on broad leadership skills within an underpinning academic research development process is the GYA's African Science Leadership Programme (ASLP). A programme to develop mid-career researchers, it is based on the recognition that 'the kinds of skills needed to lead projects with diverse, multidisciplinary teams include reflective practice, strategic planning, engagement with a host of stakeholders, effective communication, and the ability to foster a culture of collaboration'[xii]. Annual residential workshops are combined with mentoring and project work. Participants, all exceptional emerging research leaders, span the discipline spectrum. Its participants and alumni comprise more than 50% women.

2.3.5 External programme comparison

Table 3 illustrates how a selection of external programmes map against development of 1. research, 2. self as a researcher and 3. leadership. In view of the theme of gender identified by the research, the table also includes development programmes designed for women. The programmes chosen as illustrations each have at least one strong element of what might constitute an effective external research leadership programme. Their content, scope and availability are outlined in appendix E. As shown in table 3, none of the programmes on their own cover all the elements contained in our concept of holistic research leadership.

Table 3 Examples of training and development programmes relevant to research leadership in Africa

	Programme	Research development	Researcher self-development	Leadership development (relational transferable skills)	Women self-development
1	DELTAS Africa (Developing Excellence in Leadership, Training and Science Africa)	X	X		
2	CIRCLE (Climate Impact Research Capacity and Leadership Enhancement, AESA	X	X		X
3	CARTA (Consortium for Advanced Research Training in Africa)	X			
4	FLAIR (Future Leaders African Independent Research)	X		X	
5	AMARI (The African Mental Health Research Initiative)	X	X		
6	GYA (Global Young Academy)		X	X	
7	AAU (Association African Universities)		X	X	
8	CCL (Centre for Creative Leadership)			X	
9	CALD (Centre for African Leadership Development)			X	
10	CIDT Women in Leadership Course			X	X
11	PWC – Africa			X	
12	The Knowledge Academy			X	

2.3.6 Programme design and implementation

Studies examined in the literature review made wide-ranging recommendations on best practice in both research and researcher development. At programme conceptualization, views from local stakeholders must be incorporated to ensure institutional ownership, and design be well-tailored to fit differing needs (e.g. of disciplines, career stages and qualifications). Platforms of engagement and networking are very important. Capacity building should include international collaboration, postdoctoral research support and targeted research grants. Programmes need to consider from the outset that potential setbacks to success include funding challenges, limited administrative support and lack of a framework to monitor and evaluate goals. More widespread use of local consortium approaches could strengthen general research infrastructure, create platforms for academic mentorship for early career researchers and build overall research capacity in African universities.

Since the publication of these studies, AAS has continued to develop collaborative, capacity building programmes such as the Research Management Programme in Africa (ReMPro Africa[xiii]) and DELTAS itself. Most programmes have elements of research leadership as well as capacity strengthening. Among new AAS programmes under development is a research management systems programme to improve efficiencies in grant submission and financial management for academic staff involved in research. Another developing initiative is a pan-African research ethics body. At individual researcher level, one pan-African approach to strengthening research capacity and researcher careers is the AAS Affiliates Programme[xiv].

3. Results

Across the project we gained the views of 330 individuals. Participants were based in 25 African countries[xv]. They included 35 senior research leaders (interviewees and pilot focus group). 29% of the participants in interviews and focus groups were women (18/62); women made up 48% of survey respondents. Women's participation in the survey in particular is notably higher than their representation in the African academic workforce (see 2.1).

3.1 Interviews

The interviews with 24 successful research leaders explored different stages on the path to research leadership, complementing the insights gained by the survey and focus groups by probing subtle and contextual issues in participants' career and development journeys. Interviewees worked in institutions in Côte d'Ivoire, Ghana, Uganda, South Africa, Kenya, Nigeria, Zimbabwe and Tanzania.

Questions covered the areas of personal motivations, challenges and competencies; personal and institutional actions for gender inclusion; institutional actions needed for transforming the leadership path in African research; and what would have been useful to know along the way to becoming effective leaders of the next generation. Appendix F gives further detail.

3.1.1 Creating a personal vision and career plan

A common interview thread was the theme of career ownership and planning: from an early stage interviewees made deliberate choices to advance their development towards leadership. Early realisation of a personal vision and mission for their research led them to strategic choices in career development, often but not necessarily taking them outside Africa at doctoral and (sometimes) postdoctoral stages before returning 'home' to be research leaders. Participants made a distinction between two routes to international recognition: one through becoming a research leader; the other through becoming an 'international researcher'. Whether or not they had spent part of their career

> "the decision to come back home was also critical because I could have stayed in the US and still be one of the many research associates or whatever. But I decided to come back to the University and start my own research group and tried to make a difference."
>
> Interview participant

outside Africa, all interviewees described a strong personal commitment to the African continent.

3.1.2 Stages in leadership development: transitions and enablers

Interviewees identified common transition points and developmental experiences on their paths to research leadership. Agreed transition points were: completing a doctorate; gaining postdoctoral experience; getting leadership responsibility; leading a team. In later career, researchers led other leaders (where managing, for example, major programmes); some had moved a stage further to lead organisations such as research institutes. In order to achieve these various career transitions all interviewees cited gaining the requisite research capital, with special mention of skills in writing for publication and grant applications and accessing funding.

At each career transition, the individual needs to change and develop new competencies to undertake new responsibilities. For example, when leading others, the focus of time management shifts from one's own work to that of others, and alters the relative importance of different aspects of one's workload. Many participants reported they had no training or support in transitions. Where they did, commonly mentioned enablers were access to mentors, international opportunities, or gaining experience in another sector.

3.1.3 Personal effectiveness and systemic challenges

Personal qualities were agreed to be important in research leadership to achieve personal effectiveness, but this could be hampered by factors such as institutional barriers and culture, balancing priorities in their academic roles to focus on research, and difficult relationships with collaborators. Challenges relating to leaders' African experiences were scholarly isolation, lack of visibility and limited access to 'like-minded' researchers. All participants expressed a passion for their research, which helped them through difficult times. Elements of personal effectiveness of particular relevance to research leadership development included: continual learning from others; effective multi-directional communication; becoming a role model; and research talent capacity building.

As research leaders develop and take on more responsibility, their personal visibility increases and hence their potential as a role model. Communication that is effective in many directions embraces the institution, partners, their team and stakeholders.

Self-management was considered important, especially in work-life balance, time management, and avoiding complacency and becoming out of date. Solutions offered included taking time for self-reflection, conducting constant personal evaluation with a view to improve, and learning from co-creating projects and wider multi-directional learning. Participants realised that effective learning was also multidirectional. They frequently expressed concerns about being able to find the time for continual self-development, a recurrent theme for participants balancing multiple work roles and personal life.

There were multiple comments about under-optimisation of research activity within universities, with many concerns around research governance, management and funding. Key challenges for research leaders were reported as: influencing senior management; maintaining reputation and credibility; scarce resources including skilled and

knowledgeable colleagues; and lack of financial support to secure international linkages. Managing risk was also highlighted as a key challenge in the group consultations with DELTAS research leaders. Strategies to deal with these challenges variously required awareness, monitoring, problem solving, influencing skills, reflective learning, maintaining personal values, and being creative with limited resources.

3.1.4 Engagement, influence and impact

These areas were considered very important determinants in a research leadership position. Impact was seen to require global engagement, either as a research leader, or as an internationally recognised researcher, and institutional support necessary in building an international presence. As described in 3.1.3, commonly stated challenges included research governance and management, as well as sustainability. Interviewees cited challenges of bureaucracy, lack of investment in relevant knowledge and skills, and of mobilising collective effort. Leadership responses required innovative approaches, involving others, and effective communication.

> "Providing exemplary leadership by doing to achieve the goals that have been set. For example, during bidding, they would come up together with a team to write proposals or manuals with a goal of impacting the region and the community through collaboration with specific goals like manuals on food security and HIV/AIDs. The manuals should be believed by the people rather than imposing ideas on them.."
>
> Interview participant

As in other parts of the interviews, participants underscored the importance of values. These encompassed 'shared ethics and world views' between research partners and leading by example within the research team. Focus on values applied at all levels of engagement, influence and impact – from global to local.

3.1.5 Fundamental leadership principles

The interviews probed examples of globally-recognised leadership principles in the areas of 1. values, 2. relationships, 3. resilience and 4. taking action. The most common qualities identified in these areas included:

1. integrity (ethical and principle-led work habits); credibility; vision
2. relationship-management; developing others; decision fairness; outcome concern
3. self-awareness; self-management; lifelong learning
4. mobilising others; results focus.

3.1.6 Competencies of a research leader

There was much discussion about the competencies of research leaders, using the RDF for reference. Participants found the framework useful in thinking about building research capacity and mentoring others towards research leadership.

All the competencies presented in the RDF were viewed as important and there was some difficulty in selecting priority competencies, as these may depend on context. In general, however, the highest priority competencies were seen to be knowledge base, cognitive abilities, creativity, personal qualities, professional conduct, research management, finance,

funding and resources, working with others, and engagement and impact. Examples of how participants described these competencies are given in figure 1.

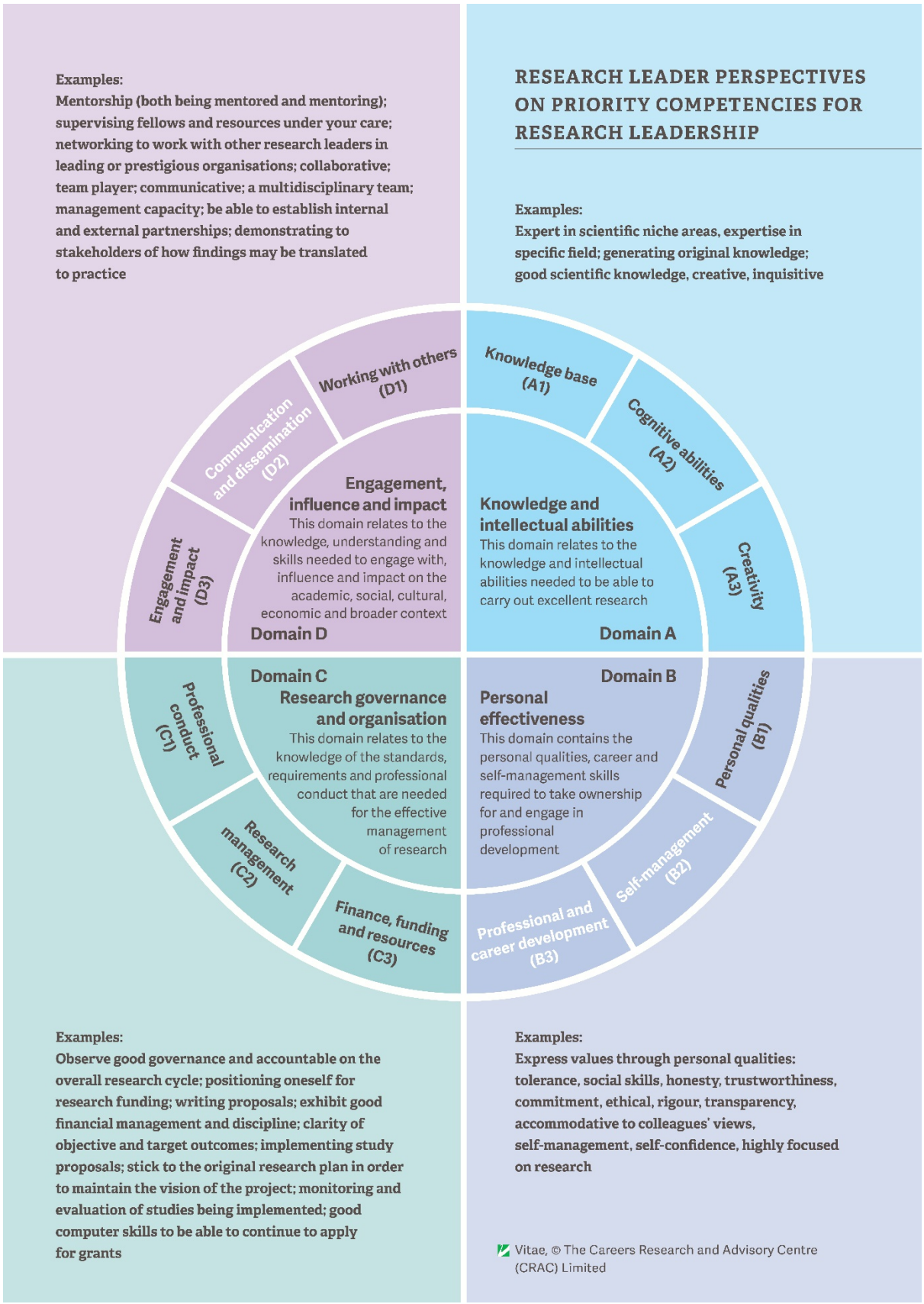

Figure 1 Research leader perspectives on priority competencies for research leadership. RDF competencies selected as most important are shown in bold (A1, A2, etc.)

Interviewees repeatedly indicated that building a 'pillar' of research excellence should be the predominant focus of the start of the path to research leadership. On the later stages, there was general agreement that research leadership is the integration of competencies to deal with complex tasks, as summarised in the box below. Emerging and established research leaders must bring together competencies that go beyond the day-to-day research to lead research, researchers, programmes and institutes effectively.

Research leadership is:

- a blend of competencies
- knowing how to harness the competencies in a team
- multi-tasking in all directions to keep oversight of research and internal/external environments
- creating good relationships to improve the research environment and team, and enhance research output

Research leadership requires competencies for complex tasks:

- Become recognised internationally for research
- Create an environment that enables research productivity
- Enhance local contexts in collaboration with other local institutions
- Enable women who are constrained by cultural and normative gender roles
- Set the research agenda
- Navigate environments that are not always enabling and are highly competitive

3.1.7 Reflecting on own career

Participants concluded that more structured career planning and a proactive approach to building their research profile would have been welcome, as would preparation for trying to balance work and personal life. Navigating cultural and institutional environments impacted all stages of participants' careers. For the women research leaders, navigating these complex environments also required managing societal expectations and family responsibilities. Proactively developing good work relationships with colleagues was important.

Curating research profiles and trajectories on academic community platforms such as ResearchGate and Academia.edu was not part of the culture of research capacity building when the senior academics were building their careers and so, when questioned, they felt a disconnect with this culture.

3.1.8 Advice to the next generation of research leaders

Reflections and advice for the next generation about how to develop researcher leadership fell into three categories: training and development routes, research knowledge and practice, and personal qualities researchers need to develop. Table 4 gives a summary.

Table 4 Interviewee advice to the next generation of researchers

Training and development routes	Mentorship, find role models. Timely formal leadership and management training supported along with experiential learning (courses not enough)
Optimising research expertise	Scientific grounding/subject knowledge, sound research planning, evidence of track record, undertake peer review, writing academically, publishing/co-publishing, learn how to attract research funding and manage grants
Personal qualities to be developed	Collaborative, focus, resourcefulness, competitiveness – stand out, strategic and critical thinking, perseverance, open mindedness, problem focus, self-belief, respect for others, passion, assertiveness, sensitivity to ethical approaches – including gender

Participants recommended researchers seek out a number of diverse routes to develop their leadership potential. It was stressed that at the same time as building their research profile, researchers have to be open minded: all the while giving attention to broader aspects of their research (using strategic and critical thinking and ethical sensitivity) and their personal development.

3.1.9 Existing training provision

Mentorship and mentorship programmes featured strongly in the discussions of institutional support for research development. International collaboration featured as did examples of formal, structured leadership training (e.g. the Perfect Programme at the University of Zimbabwe[xvi]). Examples of training for specific topics (such as grant writing) included both face-to-face and online training. Funding for internships, work opportunities or time off work were mentioned as in place and/or important to put in place. Funded programmes included small grants in the area of primary health care, PhD grants, and sabbaticals.

Research training schemes for early career researchers existed at institute and school level at some institutions. These schemes implicitly included the goals of training research leaders. Most of these schemes were funded by external funders (usually US or European based), but delivered by local researchers in collaboration, in some cases, with northern partners. The focus was primarily on developing research capability, rather than specifically on leadership development.

3.1.10 Extending approaches to developing early career research leaders

Participants spoke frequently of the value of experiential learning for early career researchers and providing an enabling environment that included a critical mass of other research leaders from whom to learn. There was a consensus that broader structural support was needed at the university level to create equitable and gender-sensitive models of research leadership training and research capacity building. Talent management was thought an important means to develop research leaders.

Researchers needed help in creating networks and gaining exposure with established researchers. Extending mentorship and training opportunities were frequently recommended. Researchers – especially women – should be encouraged to take up such opportunities. Researchers should also be given responsibilities, including teams to lead and other tasks targeted on developing their leadership potential such as brokering

international opportunities. More small grants for early career researchers would provide further developmental opportunities.

3.1.11 Identifying leadership potential

Identification of leadership potential was by informal means: observing how researchers work, interact, and present their work as well as reading their research outputs. Assessment of potential was a combination of how research activity was conducted (such as clear/decisive thinker; results-driven; ability to adapt to institution dynamic) and personal qualities (such as forward looking attitude, challenge oneself to improve, drive and tenacity).

3.1.12 Increasing the number of women research leaders

Participants were asked to describe current practices and recommend practices to increase the number of women research leaders.

In terms of current practices, approaches to supporting women were fairly limited to personal one-to-one supportive interventions. More strategic approaches or policies may exist at institutional level but were not referenced by participants. Regarding what might be done, participants made wide-ranging recommendations:

Changes in policy and practice such as:

- national policies around women researchers and the opportunities available to them as interventions to address marginalisation of women researchers at institute/school level
- specific efforts to identify women with leadership potential and develop them
- promoting equal opportunity and recruitment through a quota system for women
- mainstreaming gender in all research activities and make including women mandatory in research funding
- creating enabling environments and programmes[xvii].

The challenges identified by interviewees commonly focused on gender pre-determined roles in the family and home, rather than issues in the research environment. Women were expected to 'first sort out' their home and social responsibilities and obligations: aspiring men research leaders did not have these constraints.

Mindsets of women as well as men needed to change, so that women realise they can be a research leader. Culture change must start at primary school to enable girls and young women to feel able to take up challenges.

Suggestions for specific actions included postgraduate scholarships for women and dedicated mentoring programmes and other female-only schemes; special provision, such as when travel is required, provision for babies and nannies/larger rooms; gender-sensitive grant schemes.

3.1.13 Implications for future leadership development programmes

To summarise the key interview themes for future leadership development programmes:

- Research development and management
    - ➢ Rigorous research based on strong scientific purpose

    - Developing the vision: building a research profile
    - Association with local and international institutions
    - Good financial management
- Self- and career development
    - Learning from others: mentors and role models
    - Self-engagement with a career path and planning for leadership
    - Building an international presence
    - Achieving work-life balance
- People and environment
    - Working with others; developing relationships; building networks
    - Culture, values and environment
    - Navigating complex cultural and institutional environments
- Leadership focus
    - Awareness of leadership challenges
    - Learn leadership and management principles
    - Leadership competencies development.

In this context, it should be noted that interviews were wholly focused on present and past experience: research leaders were not asked to consider changes in the research environment that might have implications for the future design of leadership development. For example, discussion revolved around traditional scientific pathways and the scientific endeavours that are traditionally based and encouraged in the Academy, rather than newer and growing forms of engagement, such as interdisciplinary research and open science.

3.2 Focus groups

The four focus groups, where early career researchers were well-represented, added a 'bottom-up' perspective on the nature of research leadership and characteristics and competencies of research leaders. Participants discussed at length their own leadership development needs and priorities, systemic challenges to their fulfilment, and ways they could be met. Appendix F gives further detail.

3.2.1 'Good' and 'bad' research leadership

There was consensus that research leadership involved leading a team, leading by example and creating the path for team members to achieve established goals of research; primarily, accessing grants, getting published and getting promoted.

'Bad' leadership was often experienced as lack of guidance. This stemmed from the leader's lack of relevant expertise and/or from inaccessibility due to multiple work pressures:

> *"Poor disciplinary knowledge and inability to guide the student within the disciplinary field… research leaders…constantly pressurised through multiple responsibilities…the pressure associated with the 'numbers game' within publishing and student throughput…"*
>
> Focus group participant

Figure 2 is a summary of participant views on what 'good' research leaders do, mapped to the RDF. Personal qualities for personal effectiveness (RDF domain B) are much mentioned. Among these, and also in domain D engagement, influence and impact, relational leadership competencies feature strongly. Partly

because leadership is relational, there is no 'one-size-fits-all' definition of successful research leadership: 'within leadership there is a 'fit' to those who are led'.

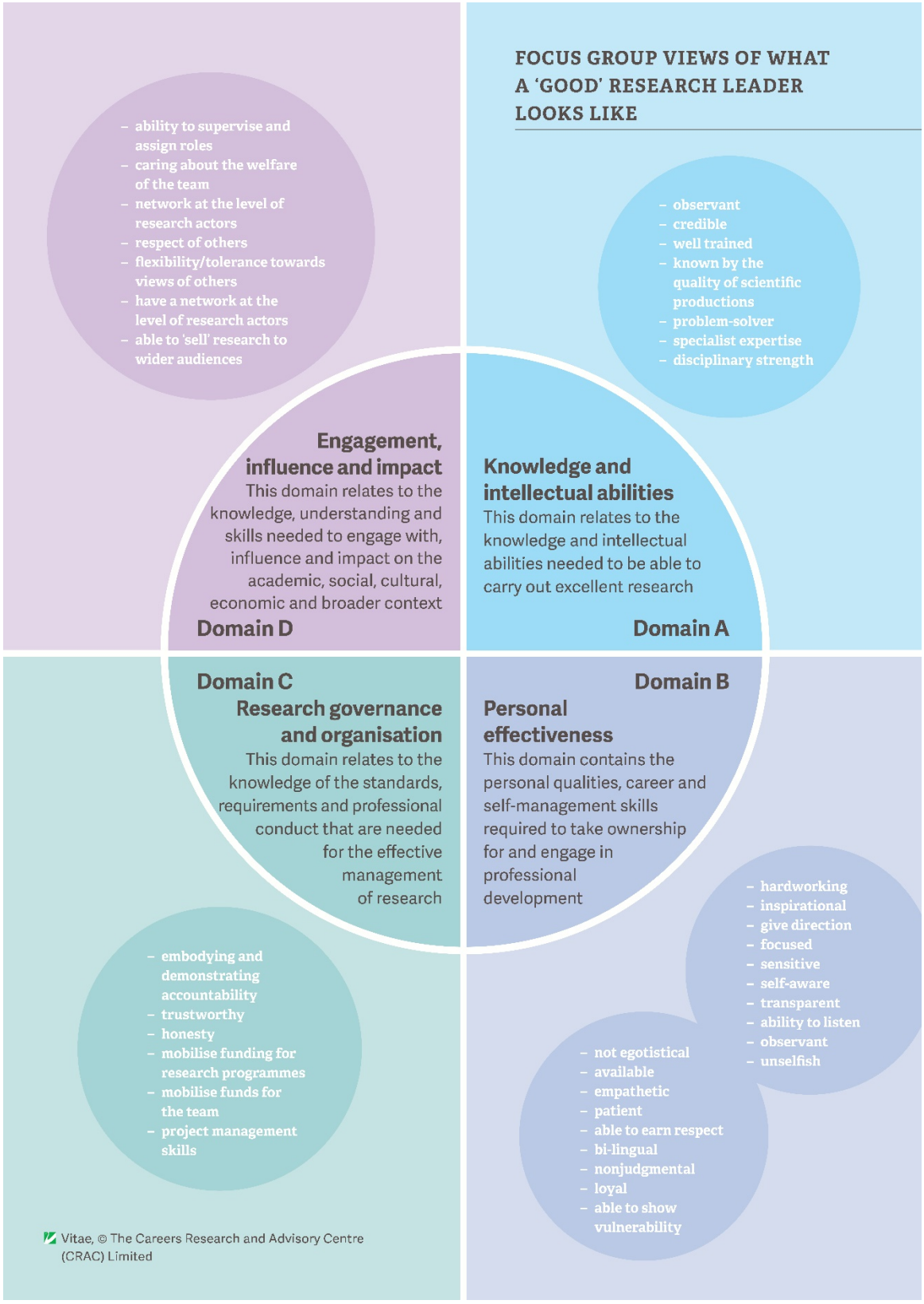

Figure 2 Focus group views on the attributes of a 'good' research leader, mapped to RDF domains