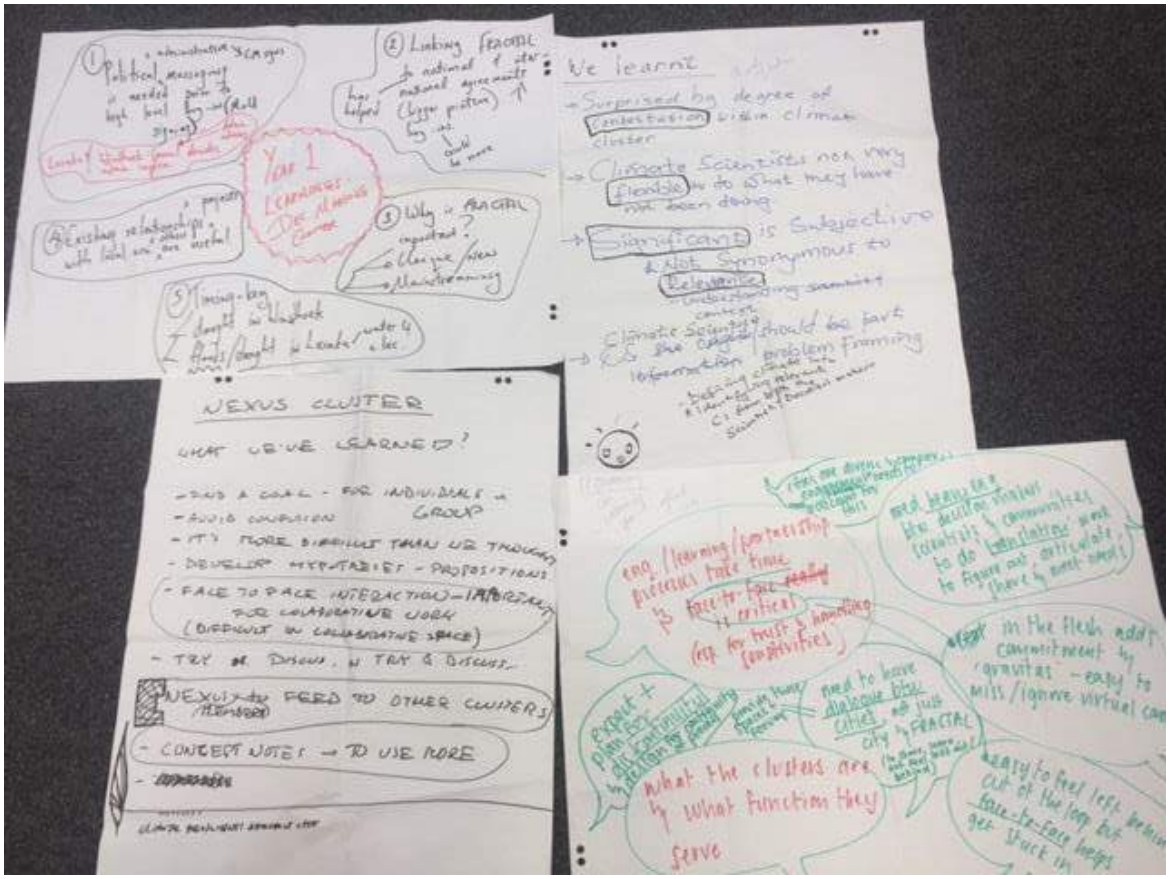
Future Resilience for African CiTies and Lands (FRACTAL)

Imbizo report



Cape Town

24 June 2016

Table of Contents

Introduction

Future Resilience for African CiTies and Lands (FRACTAL) is a four-year project with the overarching aim to advance scientific knowledge about regional climate responses to human activities (such as burning fossil fuels, changing land surface cover, etc.) and work with decision makers to integrate this scientific knowledge into climate-sensitive decisions at the city-regional scale (particularly decisions relating to water, energy and food with a lifetime of 5 to 40 years). FRACTAL is designed to work across disciplines and foster strong collaboration between researchers, city government officials and other key decision makers in southern Africa.

FRACTAL was initiated in June 2015, and a kick-off meeting was held in August 2015. Acknowledging the progress that was achieved during Year 1 of the project – both in terms of research and operations – an "imbizo"[1] was organized for June 2016. The main aims of this event were to reflect on FRACTAL one year in, share updates and feedback on research undertaken among clusters of collaboration, as well as provide insights into Year 2. Importantly, the imbizo will not replace the annual event, which is set to take place at the beginning of November 2016.

Considering the composition of the FRACTAL team, a number of team members attended the imbizo virtually. This was enabled through four main platforms: i) BlueJeans webinar application; ii) slack; iii) Google drive; and iv) a physical representative at the Imbizo (to be the voice of the virtual people). The particular tools that were used by virtual attendees to engage with imbizo activities depended on the nature of each session.

This report outlines the main sessions that took place during the workshop, focusing mainly on discussion points and outputs where appropriate. The report, presentations and other supporting documents, will also be made available in the password protected side of the FRACTAL website (www.fractal.org.za).

[1] Imbizo is taken from the isiZulu word biza, which means to call or summon or a gathering of people.

Session 1: Introduction

Bruce Hewitson (lead PI) opened the Imbizo, explaining the order of the day and expectations from participants. He highlighted two important aspects that influence the evolving project trajectory and should therefore be considered during the course of the day, and into the future of the project (see Table 1 below).

Table 1. Internal and external aspects influencing evolving project trajectory

Two aspects that influence the evolving project trajectory	
External factors	Internal factors
• new initiatives (e.g. IPCC 1.5deg Special Report) • changing contexts (e.g. World Bank facility to inform investment) • advances made by others in the scientific community / consortia • accelerating interest by other cities / researchers • expectations and framing by funders	• Silo'd research and/or contested ideas • Dead-ends and non-productive avenues • Challenges that prove more complex than anticipated • Logistical hurdles and difficult experiences • Necessity to reframe based on emergent understanding • Language, terminology, and misunderstanding

To set the tone of the day, Bruce urged participants to: i) listen to each other and consider how others might see issues; ii) contextualize perspectives to weight priorities; and iii) respond in the ":third space" thinking. The importance of collaboration in the context of FRACTAL and during the imbizo was emphasized because "the whole is greater than the sum of the parts". Bruce also reminded team members to integrate personal interests into planning, in line with project needs.

After Bruce's introductory session, John van Breda and Rika Preiser were introduced to set the scene with regards to complexity thinking.

See Bruce's presentation here.

Session 2: Complexity, resilience and transdisciplinary in the context of FRACTAL

Session 2 included two presentations from representatives of the Centre for Complex Systems in Transition (CST) in Stellenbosch: i) Rika Preiser gave a brief introduction to complexity and resilience; and ii) John van Breda chatted about transdisciplinarity as a movement to tackle complex problems.

During Rika's session, philosophical ideas behind complexity thinking were introduced. Linking back to Bruce's opening session, Rika presented the idea of "the whole being a sum of parts" in the context of complex systems, which should shape the way we deal with these systems. In line with this thinking, she described the limitations of the reductionist approach, and how we should steer away from this thinking. Rika described that a "system" is a set of things that are interconnected in such a way that they produce their own pattern of behavior over time. She also introduced the "complexity paradigm" and features, dynamics and capacities of complex systems. Rika then introduced the "Anthropocene challenge[2] that we

[2] "As the name suggests, the defining feature of this era is the emergence of human action as a critical force in a range of biophysical systems. One consequence of this development is that any attempt to explain or predict the behavior of large biophysical systems can no longer succeed without addressing human actions as a central concern'' (doi:10.1016/j.gloenvcha.2007.01.001)

are currently facing: *how do we provide a good life for all, both current and future generations, without undermining the functioning of the planet?* The idea of resilience thinking was then introduced as an approach to sustainability, which focusses specifically on building capacity to deal or take advantage of unexpected change. Rika then presented three overarching approaches to resilience thinking: i) resilience as: i) a system property; ii) as an approach; and iii) as a desired outcome. After discussing these three approaches, Rika finished by presenting general implications for how we tackle problems, and for studying complex systems (See Table 2 below).

Table 2. Complexity thinking: implications for how we tackle problems.

Implications (CST 2016)	
Tackling complex problems	For studying complexity
• Complexity and resilience thinking provide some general premises that may help to reduce the tendencies towards oversimplifying reality, and open the way to seeing more of the complexity as embodied in relations & patterns • always partial knowledge, demands a plurality of epistemologies • studied by transdisciplinary, integrative and participatory methods • ethics of engagement & responsibility	Complexity thinking: • provides a **lens** with which to study the realities of networks, hierarchies and feedbacks • reveals the imperative of social and ecological **interdependence** • offers a **toolbox** of methods with which to study non-linear dynamics and emergence • offer **integrative insights** into how we should act which has implications for policy-making and activists strategies towards more sustainable and just futures

See Rika's presentation here.

After Rika's presentation, John van Breda chatted to the team about a Transdisciplinary (TD) approach for dealing with complexity. John described the history of TD and described the role of this idea/approach, particularly when dealing with the "Anthropocene". Five overarching fundamental principles of TD were introduced: 1) collaboration 2) transformation 3) integration 4) innovation and 5) egalitarianism. John also described the processes involved in TD work and knowledge co-production, then ended with the "Enkanini" TD case study. This case study was implemented through Stellensbosch University to understand better how transformative knowledge can be co-produced in the present to empower people to improve their situation whilst waiting for service delivery in marginalized areas in South Africa.

See John's presentation here.

Session 3: cross-cutting session: evolution of FRACTAL: aims, objectives, research questions and FRACTAL Theory of Change (ToC).

Session three narrowed down the focus for the day to review the FRACTAL timeline, evolution of the operational structure, research questions and ToC (See Figure 1 below). After an introduction to these overarching projects aspects, the FRACTAL ToC was revisited during a breakaway exercise. During this exercise, groups interrogated intended outcomes from project activities and research.

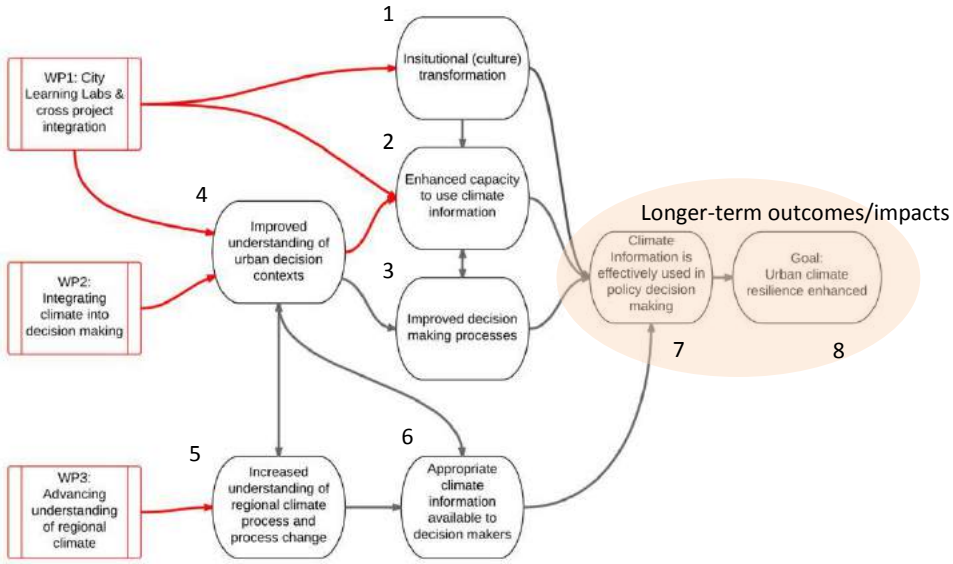


Figure 1. FRACTAL ToC, with numbered outcomes that were interrogated during the breakaway session.

Each of these outcomes was traced back to research question(s) and groups brainstormed around indicators for the outcomes in the ToC. The last two outcomes in the ToC (7 and 8) are nearer the end of the pathway of impact (operationalized in the longer term) and were not assessed at the Imbizo. These last two outcomes are not as directly related to the FRACTAL activities and it is therefore more difficult to think about their associated indicators and timelines. The outputs for this session are presented Table 3 below.

The breakaway exercise sparked thinking around the context within which the ToC is normally presented; in particular, breakaway groups felt the need to define some of the outcomes before answering questions related to research relevance and potential indicators.

Table 3. Interrogating FRACTAL outcomes in the ToC

Outcome	Indicators	Target	Time-frame	Means of Verification	Risks
1. Institutional (culture transformation)	• At a city level: climate change on the development agenda (actors centrally involved in water and energy decision making)	• Evidence of improved engagement between: i) government and universities; and ii) municipalities, local communities and civil societies.	Long term (with some evidence during the project)	• Lists of participants from social learning labs • Outputs from the M, E & L process • Dialogue with actors involved in decision making	• Power and politics/conflict of interest undermine objectives • Limited resources for new dialogues • Limited time to develop trust and change institutions
	• At a project level: TD work within the FRACTAL team	• Evidence of embedded researcher attends numerous municipal meetings across sectors • Evidence of joint decision making between people or groups who haven't worked together before	Impacts will be seen during the project lifespan	• Embedded researcher progress reports • Cluster meeting notes • Outputs from the M, E & L process	
2. Enhanced capacity to use climate information	• Improved confidence for engagement and dialogue across departments and external agents AND improved articulation of climate information needs	• Evidence of a functional dialogue platform/structure for sustained dialogue between departments and external agents (not bound to the project) • Applicable, relevant climate knowledge has been co-produced	Long term (with some evidence during the project)	• Outputs from the M, E & L process • Ongoing dialogue with government departments	
3. Improved decision making processes	• Transformation of mindsets and capacity/knowledge of multiple actors within and outside of climate specific contexts	• Evidence of decision processes that consider an alternative approach that wouldn't have	Long term (with some evidence during the project)	• Outputs from the M, E & L process • Activities undertaken by the decision-making	

Outcome	Indicators	Target	Time-frame	Means of Verification	Risks
		happened prior to FRACTAL		cluster to track changes	
4. Improved understanding of urban decision contexts	At the project level: enhanced understanding of FRACTAL team members of the context within each city (and other cities).	Evidence of understanding of the FRACTAL team of an integrative outline of the complex context of a dynamic DM process	Ongoing/long term (with some evidence during the project)	• Outputs from the M, E & L process • Activities undertaken by the decision-making cluster to track changes	• The dynamism of the systems that we are trying to better understand complicate the process of measuring this enhanced understanding
5. Increased understanding of regional climate processes and process change	• Improved understanding of policy makers and climate scientists with regards to climate processes over the sub-continent • Evolution of methods for exchanging information between policy makers and climate scientists	• A number of city-scale observation datasets of rainfall, temperature and other variables • Academic papers and publications on: i) processes and interactions that drive variability and change; and ii) causal reasons for the range of projections from predictive tools and methods • Evidence of a shift in information exchange and knowledge (co)production between policy makers and climate scientist	• Observation datasets: Year 2 • Academic papers and publications: Year 4 • Shift in information and knowledge production: ongoing with evidence during the project	• Existence of city-scale observation datasets • Existence of academic papers and publications • Outputs from the M, E & L process	• Poor observation networks undermine project activities and outcomes • Scientific questions are not structured correctly to address relevant issues • Irreducible uncertainties associated with climate change projections undermine project activities and outcomes • Time constraints of people; poor attendance of workshops/co-explorative process limit the co-production
6. Appropriate climate information available to decision makers	• Enhanced articulation of climate information needs • Improved accessibility to and application of	• Availability of climate information that is relevant at a city scale • Improved dialogue between decision	Bounded by the timeline of city development masterplans - ongoing afterwards (with some evidence during the project)	• Number of tools/products communicating climate information,	• Uncertainties around the future climate system as of now (limited process description) undermine project

Outcome	Indicators	Target	Time-frame	Means of Verification	Risks
	information within decisions • Improved understanding between climate scientists and decision makers	makers and climate scientists, particularly with regards to requests for nuanced climate information		relevant to a city scale, available • Evidence of dialogue between decision makers and climate scientists, particularly with regards to requests for nuanced climate information	activities and outcomes • Limited willingness to accept and act accordingly amongst local governing agencies
7. Climate information is effectively used in policy decision making	Longer-term outcome (domino effect from more immediate outcomes)				
8. Goal: urban climate resilience enhanced	Final outcome (domino effect from climate information being effectively used in policy decision making).				

Sessions 4, 5 and 6 Feedback from Year 1: all clusters

During Sessions 4, 5 and 6 (led by Chris Lennard), cluster co-chairs provided feedback on engagement and research from the first year of FRACTAL, and broad ideas for Year 2 of the project. This feedback was provided in three particular sessions: i) general feedback from each research cluster; ii) challenges faced in the first year; and iii) broad plans for Year 2. An extra session was also added after the feedback cluster sessions, during which FRACTAL team members described three main lessons that they had learned during Year 1 of the project. All feedback from clusters of collaboration is summarised in Table 4 below, with detailed notes in Annex C.

Challenges that were common across clusters are listed below. These challenges should be considered when developing Year 2 workplans, particularly considerations around whether these challenges are likely to continue being experienced and how they can be overcome.

- Long process for establishing local partnership agreements – MoU & sub-contracts – held up Learning Labs & recruitment of
- Translation requirements in Maputo
- Difficult finding & maintaining synergies with climate info cluster – cross-cluster reps; cross-cutting cluster
- Balancing / navigating multiple needs, demands, values, objectives within the project (scientific; technical; political; admin…)
- Lack of face-to-face communication. Communicating with partners at different institutions and in different countries.
- How to avoid retreating to the disciplinary safety and stay in the "3rd space"?
- Organizational placement & positionality of local partners & ERs – access to decision-making spaces and processes
- Building convening power – getting the 'right' people to the Learning Labs (repeatedly) – city visits
- How to engage and work with Tier 2 cities & self-funded cities – grants
- How to narrow down and target 'burning issues'
- How to connect and engage with stakeholders beyond city government
- How to capture learning and learn about learning
- How to work together effectively in TD ways without suffering from meeting / talking overload & withdraw – how to design & monitor TD aspects / processes throughout the project
- staying true to the project's principles
- be need-driven, but remain within project's scope
- avoid "extractive"/"safari" science, crate win-win setting
- negotiate workshop and project fatigued community
- negotiate politically-charged landscape

To view cluster presentations, see here: i) city learning; ii) climate information; iii) decision-making; and iv) nexus.

Table 4. Feedback from clusters of collaboration: main activities during Year 1, key lessons and challenges, and overarching plans for Year 2.

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
City learning cluster		

• All Tier 1 cities were visited and **relationships** were built with city partners and prospective stakeholders
• Representatives from Tier 1 cities attended the **CSAG Winter School**, along with the Embedded Researcher (ER) from Lusaka and the potential ER from Maputo
• Five city **background reports** were developed in Year 1. These will feed into the climate information cluster
• A **meeting** was convened with **self-funded cities**: Cape Town, Durban and Johannesburg
• A **briefing note, draft plan** and schematic diagram have been developed for the **Learning Lab process**
• A number of cluster team members are involved in developing two **working papers** that describe the city learning & FRACTAL framing concepts
• A **graphic overview** for the **Monitoring, Evaluation & Learning** (M, E & L) framework and practices has been drafted
• **Synergies** are being developed with other clusters (e.g. decision methods review to guide work of ERs)
• **Engagement** between **Tier 1 & tier 2 cities** has been initiated through GEC proposals
• **Draft 0** of the **Tier 2 City MoUs** have been developed and sent to city focal points
• MoU and sub-contracts have been signed for Lusaka, and are close to signature in Windhoek. The MoU for Maputo has been signed
	1. Engagement/learning/partnership processes take time and face-to-face is critical (especially for trust and handling sensitivities).
	  • In the flesh adds commitment and 'gravitas' – easy t miss/ignore virtual communications.
	  • Easy to feel left behind/ cut off the loop but face-to-face helps get stuck in.
	2. Cities are diverse and complex; engagement and research needs to really account for this. Need heavy engagement between decision makers, scientists and communities to do 'translation' work to figure out, articulate, and share and meet needs. Need to have dialogue between cities, not just city and FRACTAL (to share, learn, and not feel left out/behind) - need to provide those spaces and forums.
	3. Expect and plan for discontinuity in cities and FRACTAL team.
	4. Have had to deal with tensions, instabilities and discontinuities, within and between teams & organizations (local govt elections)
		➢ Refine & elaborate the learning framework; operationalize practices & techniques to document learning & adjust plans
		➢ Works plans, network and training with embedded researchers, linking across clusters
		➢ Stakeholder / knowledge-holder network mapping (city, regional and global scales), identify influential nodes and important bridging people / orgs – reach out, communicate, engage, share
		➢ Convene Learning Labs (at least 2 per Tier 1 city), linking across clusters
		➢ Identify, refine, distil, prioritize, sequence 'burning questions' – translate between problem statements & research questions (practitioners etc.)
		➢ Facilitate other city learning dialogues between Learning Labs (incl. virtual / online) – does not all depend on learning labs
		➢ Complete Tier 2 partnership agreements
		➢ Facilitate exchange learning visits between Tier 1 and Tier 2 cities and self-funded cities
		➢ Build on, distil, share 2 working papers
		➢ Contribute to designing and implementing the FRACTAL communications and engagement strategy

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
• **Learning Lab plans and guidance documents** have been drafted, they will soon be circulated for inputs; these documents include templates to gather information about resourcing the Learning Labs from all the partners, which will be integrated into broader resource planning • Four cities that will host ERs in various stages of recruitment, i.e. Durban shortlisted, Lusaka identified, Maputo has ER candidate identified but need to confirm, Windhoek will advertise once sub-contract signed		
Climate information cluster		
• The FRACTAL climate information **working framework** has been developed • Climate scientists are comfortable not being leaders in the project – other types of research leading in FRACTAL. However, there has been lots of **planning on a conceptual level**. • The climate information work around **understanding climate processes** has **interrogated five questions/themes**: i) what is our current understanding? ii) catalogue of processes; iii) catalogue of data sources; iv) how do we index/measure processes? and v) how do we index/measure process chains? • Also expanding the **idea of distillation** – how do we draw value from all the data sources • The **development of climate information for decision making** has been framed by three main questions/themes: i) can we provide useful information into decision making? ii) how we do quantify/describe the value of different climate information sources; and iii) what are the key contradictions that have consequences for decision making?	1. Surprised by degree of contestation within climate information cluster. 2. Climate scientists are not very flexible to do what they've not done before. 3. Significance is subjective and not synonymous to relevance (understanding context). Climate Scientists be part of problem framing such as defining climate information – identifying relevant Climate information from both the scientist and decision makers. 4. Challenging for some climate scientists to access documents and comms (slack and Google docs) *Climate information cluster - particular challenges* ▪ Information needs guided science is hard when you don't know what the information needs are! ▪ There are significant technical challenges involved in data analysis and modeling, do we invest time and resources into an activity that is not going to be useful ▪ We are operating in a complex landscape of "climate services" – many people providing information into decision making in one form or	➢ Observed data analysis • Contradictions between observed datasets • Sources of contradictions, resolution of contradictions (post-doc contributing to science) ➢ Climate process indexing/analysis • Identify processes and how to track them/index them • After identifying processes, assess how they have varied in the past and how process link across time and space scales • How the processes are represented in different models, can we described model performance? • Scoping numerical model experiments to answer questions of local feedbacks and convection resolving (complementing IMPALA and UMFULA) ➢ Articulation of climate information needs from the city perspective • Integration with decision making cluster and city learning cluster

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
• **City of Cape Town and CSAG** are collaborating to **develop downscaled climate scenarios and climate narratives** that will be the basis of a workshop engagement with multiple line functions	another. Contested, complex landscape that is very difficult to operate in. ▪ Different approaches and/or "beliefs" about climate science, climate modeling, and information. What is good information? What is bad information? Also a real opportunity – need to figure out how we intend to overcome them.	• Integration with Nexus cluster and impact/systems modeling ➢ Production of climate information • Drawing from process analysis understanding (distillation) and feeding back to climate process analysis • Communication (narrative approaches?) • Visualisation
Decision-making cluster		
• DM cluster has been **engaging with the nexus cluster** to develop a draft of the **conceptual model of Lusaka** city region • Arrangements are in place for the **ACC post-doc** to start in September 2016 • Cluster is well underway towards collecting and **analysing policy /planning/legislation document**s for Tier 1 cities (MSc intern at SEI supporting with dissertation) • A **transdisciplinary concept** note has been completed, which has contributed to City Learning Cluster paper on "TD, Co-production and Co-Exploration" • DM cluster is focusing on taking parts of the conceptual model from a macro level to the local level • Data and documents from city visits are being collated to start **ground-truthing information** • **Guidance for ERs on understanding how decisions are being made at city-scale is being developed** • **Formal and semi-formal decision support methods** for each city are currently being **reviewed** • Review and **catalogue of adaptation options** for **Lusaka** is ongoing.	1. Political and administrative (City Manager signs) messaging is needed prior to high level buy-in (MoU signing). 2. Lusaka and Windhoek: Council decides, administrative implementation. 3. Linking FRACTAL to national and international agreements (bigger picture) buy-in (could be more). This has helped with decision making. 4. FRACTAL is important because it is a unique/new project and mainstreaming. 5. Existing relationships and projects with local universities and others are useful. 6. Timing is key. Focus on drought in Windhoek and floods/drought in Lusaka (water for electricity). *Decision making cluster - particular challenges* ▪ Have not been able to review background documents for Tier 1 cities with city partners. ▪ Have not been able to start preliminary decision pathway analysis. ▪ Most decision-making work has been delayed. ▪ In collaborating with the Nexus cluster, it is difficult integrating the governance arrangements of each city into a TD research forum and trying to develop a common language. ▪ Not clear where overlap is between Climate Information and DM clusters in workplan – desire	➢ Finish off tasks from Year 2 ➢ Engage with embedded researcher and understand dynamics ➢ Plan for a knowledge exchange process between Tier 1 and Tier 2 cities – SOGs ➢ Work with nexus cluster on models to develop Lusaka, and begin Maputo and Windhoek ➢ SEI work – complete catalogue of adaptation options for Lusaka/tools for decision making ➢ Social science fieldwork in three cities – urban post-doc ➢ Potential demand for concept notes on: i) what resilient cities would look like (based on real world examples), finance mechanisms – move towards implementation from plans and policies; and iii) institutional placements – different municipalities dealing with climate change in different places in municipalities – pros and cons of these approaches.

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
• **Connections** with **SEI WEAP** (and potentially LEAP) models in Zambia and Namibia are being created. • A **Small Opportunity Grant (SOG) proposal** to use **Climate Change and Capacity Diagnosis (CCAD)** tool is currently being developed • **Contributing to City Learning Lab cluster work and the M, E & L framework**. • Developing **links between FRACTAL and new SEI Initiative** on Climate Services.	to be needs driven but we need to engage better to achieve this. ▪ Interpreting the policy documents from the T1 cities without the help of the Nvivo for Teams software.	
Nexus cluster		

• **Mandate has evolved**:
  • initially was "Baselines cluster" – meant to systematize "non-climatic" information base for cities
  • geared towards answering a range of questions
  • bridging the gap between science and policy
  • relevant physical information
  • relevant climate information
  • role of local-regional dependencies
  • create an entry point for climate information group, identify a tangible water-energy issue that is important for the city that can be "unpacked" by the project
  • **renamed "Nexus" and self-tasked with trans-dysciplinary processes at the interface of other clusters**
 	
• Developed a **draft conceptual model** of the city-region system of Lusaka: this is a heuristic model which **illustrates the complexity of the system**. The model described above will be used as a platform for:
  • interaction between "sciences"
	1. Find a goal for individuals and group – challenging approach, particularly in TD to avoid confusion. It's more difficult than they thought! Develop hypotheses and propositions.
	2. Face-to-face interaction is important for collaborative work (difficult in collaborative space): nexus members to feed to other clusters. Be sure that one cluster member is included in another to provide feedback.
	3. Need to use more concept notes.
		➢ Start working on actual engagement in Lusaka
		➢ Develop a relationship that we have in Lusaka in other cities

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
• discussion and reflection within TD landscape • engagement with decision-making processes • presented at LuWSI/Fractal workshop in Lusaka • Currently zooming in onto the conceptual, heuristic model to interrogate a connection (climate-related, hydrology etc.) • Have established a strong connection with Lusaka Water Security Initiative (LuWSI): possibly "our man in Lusaka" supplementing embedded researcher. LuSWI is a GIZ funded project focusing on water security in Lusaka. • at this stage, no platform for the meaningful use of system's approach • focus shifted towards identifying "tangible" water security-oriented issue with critical decision space • Kafue as water source, its CC vulnerability/resilience • Local groundwater, vulnerability/resilience • groundwater vs. Kafue as water source – strategic decision taken earlier • Have been **thinking around the idea of transdisciplin**arity: • an exemplar of TD process in the Nexus cluster will be important and useful, extension of TD throughout the entire project - needs to be mainstreamed throughout FRACTAL (drawing from the concept note on TD) • contribution to City Learning cluster - TD learning: “Co-exploration, Co-Production and Transdisciplinarity”		

Main research activities: Year 1	Key lessons/challenges	Overarching tasks: Year 2
• **conceptualising a platform for documenting TD process**es		

Session 7: Facilitated planning for Year 2/going forward

Leading on from the feedback, reflections and broad planning sessions, clusters broke away in Session 7 (after lunch) to continue fleshing out plans for Year 2 (facilitated by Alice McClure). The nature of this planning exercise differed slightly from one cluster to the next because some of the Imbizo attendees had not been involved in FRACTAL (or FRACTAL planning) prior to the Imbizo (e.g. embedded researchers and city officials in the city learning cluster). Feedback from the planning exercise is presented below according to particular clusters. See Annex D for images of cluster planning sheets.

<u>City learning</u>

- Learning Labs considerations:
  - Need to be sure that everyone is learning together, experiential, tools for learning by doing/in practice and link to action on city level (points of entry)
  - Need to be sure that the city learning process is owned – consider how to be sure everyone feels they are part of the process
  - Be aware of time/limitations of participants
  - Feel that learning lab attendees would benefit form a physical tour of the city
  - Would like to implement two formal learning lab engagements in each for Tier 1 in Year 2
- General learning considerations:
  - Need to record learnings through workshop and city engagements reports
  - Should develop a city learning journal, through which reports from trips will be shared, and questions can be asked
  - Learning retreats would be good way to reflect – would be beneficial to think about how to learn/how to facilitate better learning
- Other capacity building considerations:
  - There was a request from city officials for training on climate information at a city level – not only at Winter Schools (capacity building)
  - Create awareness and give examples of how climate information can be implemented in practical action: e.g. linking to Maputo Plan for climate change. This would be in line with efforts to make people feel part of the process and address current issues.
- Communications considerations:
  - Team members working at a city level need to remember to update slack journal channels with relevant city activities and opportunities.
  - Also need to find ways to link activities/outputs to relevant city websites
  - Would be good to create an “embedded researchers channel” through which these project team members can engage with each other and learn from each other
  - Should be sure that ERs have monthly calls or face-to-face meetings.

<u>Decision-making (useful for city learning)</u>

Not many people that have been integrally involved in the decision-making cluster were present in the group. The time was therefore used to plan around how we (as a FRACTAL team) can improve engagement with cities (particularly important for city learning cluster).

- City officials need direction with regards to communications - are currently unsure which cluster to be involved in and why (would obviously like to be involved in all but don’t have enough time).

- There was a discussion around the most appropriate engagements with cities; Mulimba and Olavi stressed the importance of emails and phone calls.
- Olavi and Mulimba are key contacts in cities, but there is a need to identify a second in case there are shifts from one department to the next.
- "Hardcore" climate information would be very useful to the cities – want to integrate climate change considerations in development and produce adaptation/mitigation strategies.
- There are a number of items on the development/climate change agenda that FRACTAL could contribute to developing (e.g. GHG emissions reports and city-scale vulnerability assessments).
- There is a need to recognise that there are potential shifts in terms of how and where climate change is being dealt with from a government perspective.
- There were also discussions around how best enable learning labs processes (how meetings should be run, key stakeholders etc.). Meggan to provide feedback to city learning cluster.

Nexus

The nexus group used the time to home in on one idea for Year 2, and flesh out activities around this idea. This idea is summarised below.

- The development of the heuristic, conceptual model will continue to provide an overview of regional dynamics associated with a resource (currently the case of water and energy in Lusaka) including power dynamics etc.
- Building on this work, the nexus cluster has the idea of homing into particular issue to explore decision nodes - questions to be asked will include:
- what steps were taken to arrive at a particular point/final decision
- what steps could have been taken?
- was climate information integrated into this decision making process? Where? how? Why? was it effective in the context of other socio-economic issues?
- if climate information/knowledge was integrated into the decision process, when was a particualr development option (e.g. groundwater vs. water pipe in Kafue) thrown off table because too vulnerable to climate change?
- Would like to take this idea and investigate it deeper during the learning labs.
- After the presentation on nexus idea, Piotr Wolski highlighted a key element of the abovementioned process: finding a group of people who will be comfortable talking about these sensitive issues.

Climate information

Feedback from the climate information planning exercise is provided in Table 5 below.

Table 5. Year 2 plans for climate information cluster.

Task	Milestone	Owner	Contributing	Timeline	Dependencies	Notes
3.1 Data catalogue	Common database archive	SMHI	CSAG, MOHC	End - 2016 and ongoing		
3.2 Climate information for first learning labs	Developed narratives for each city	CSAG	MOHC	Depends on when the city labs take place but hopefully before end-2016		1. "Justified narratives" for learning labs to be a part of the city labs discussion: This process develops evidence based narratives for each city - undertaken by core scientists of consortium and so explore envelope of considered scenarios.
3.3 Online information platform						
3.4 Baseline and uncertainties	1. Completed assessment of observed data uncertainties 2. First draft of a paper by end-2016	CSAG	MOHC	End-2016	Depends on 3.1	Needs more articulation on how to articulate characterization of uncertainty.
3.5 Climate process drivers	Identify, and assess the realism in models of, relevant remote and local processes and "process chains" important for the climate of southern Africa. Connect information on the key climate risks facing the city/regions on which FRACTAL is focusing with the assessment of process chains to identify areas of specific climate	MOHC	As per Stockholm document	Check point at annual meeting, (near full) assessment by July 2017? Something to feed into AR6 scoping?	Frequent coordination and communication, and an early discussion to converge on methodologies.	1. Should divide and conquer - captured by document Bruce sent out on Slack. 2. Maybe 2 foci: (a) one on teleconnections explicitly (MOHC); propagation of teleconnections through RCM boundary; co-behaviour of teleconnections; (b) Local and regional processes; scale dependency of local variability on regional processes

Task	Milestone	Owner	Contributing	Timeline	Dependencies	Notes
	research, including any associated methodological development, to be undertaken by the climate cluster.					3. Possibly use a network model to look at co-behaviour of teleconnections
3.6 Sources of contradictions and added value (not bias reduction!)	Unpacking sources of uncertainty as a function of scale, method, process, and error.	CSAG/MOHC	SMHI			1. How to define/quantify "added value"? And from who's perspective is added value defined? 2. Including observational datasets and reanalyses for contradiction assessment.
3.7 Synthetic climate timeseries for RDM and decision scaling exploration	Prototype climate/weather generator	CSAG				Some of the decision approaches the decision making cluster would like to explore require large ensemble type climate time series for "stress testing" or sensitivity testing. We need to develop approaches to generating these
3.8 Contribution to 1.5 degree special report	Assess the impacts on the climate of southern Africa, and relate to city sensitivities/thresholds	CSAG	MOHC, SMHI?	Mid-2017	Needs to have identified climate sensitive thresholds through working with cities	We could ask Weather@Home to run a targeted southern Africa 1.5v2K experiment to provide a large enough ensemble to clearly see the difference in signals? All we would need to do is to dedicate a server/storage space for the outputs. (Daithi could help here). CL to set up a telecon between CSAG, MOHC,

Task	Milestone	Owner	Contributing	Timeline	Dependencies	Notes
						and Daithi to explore this?
3.9 Lit review	Paper reviewing current understanding of southern Africa climate processes.	MOHC (JD)	CSAG/SMHI/JRC/CSIR	End 2016		Joe has started the process (I think)

Session 8: quick overview of FRACTAL governance

During Session 8 (led by Alice McClure), an overview of the governance of FRACTAL was briefly presented. The main items for discussion around the governance were: i) introduction to governance; ii) descriptions of the attributes of "team science" that contribute to both challenges and effectiveness of these types of projects; iii) main operational groups within the governance, management and operational structure ; and iv) main decision types - who the primary responsibility lies with, input requirements from groups and suggested platforms for decision making.

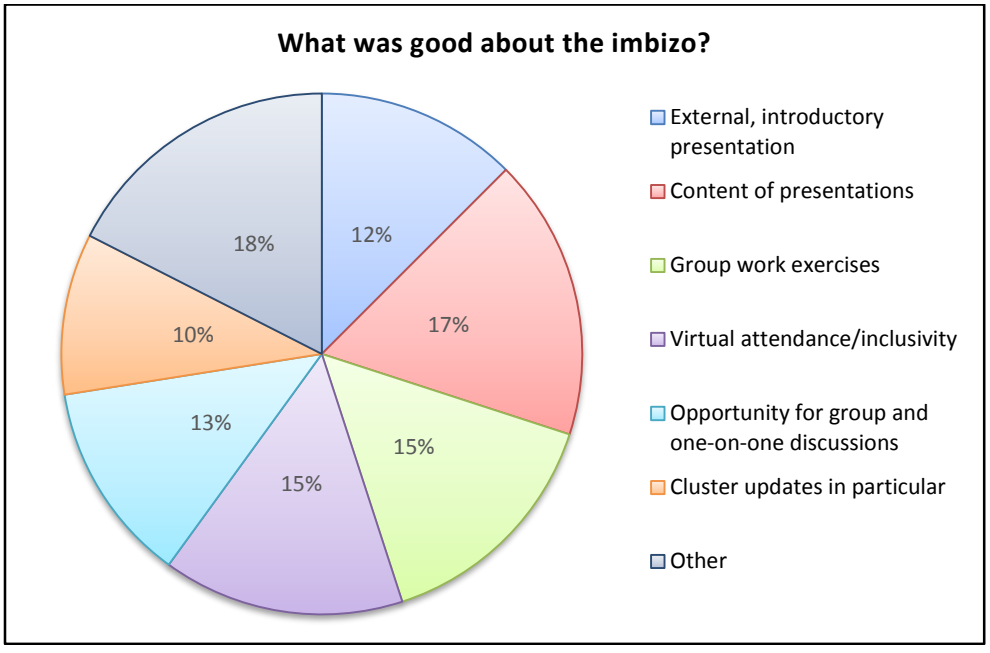
The main comments that were raised by imbizo attendees were:

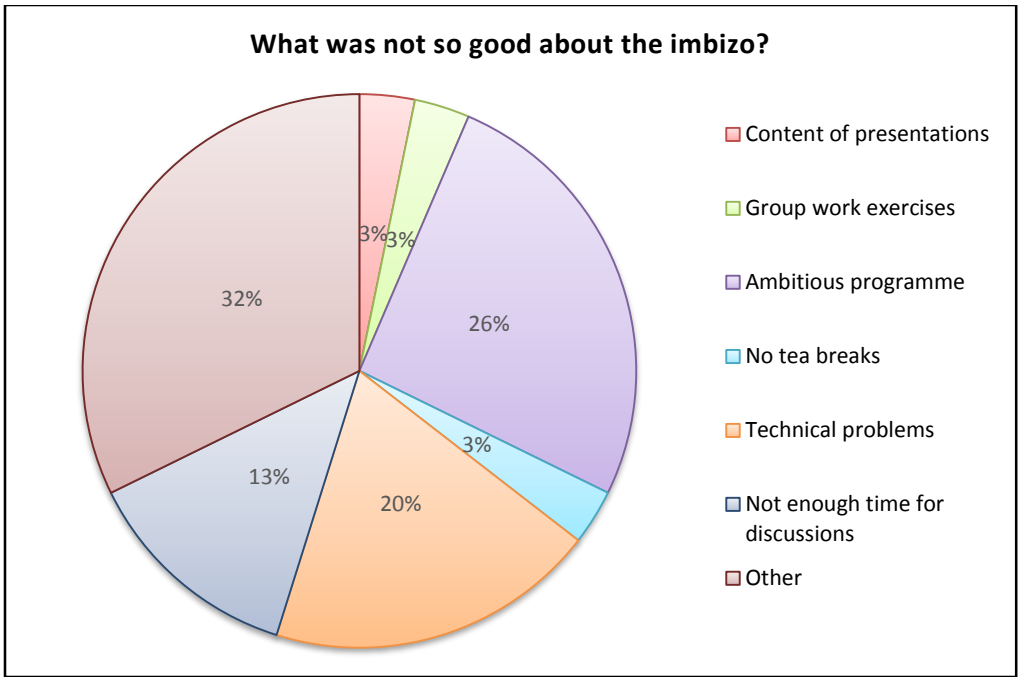
- PAT are seen as a board – not really contributing to strategic planning
- Meggan (ICLEI) was invited to be part of the city learning cluster (co-chair?)

Participants were urged to review and contribute to the governance document, which can be found here.

Session 9: Learning framework, reflections from Year 1, and on imbizo

Session 9 was led by Bettina Koelle; serving as a time for reflection on the imbizo, and Year 1 of FRACTAL in general. Each participant filled out a reflection sheet that included four questions: i) *what was good about today?*; ii) *what was not so good about today?*; iii) *what should be changed for next time*?: and iv) *can you share with us an interesting moment of learning in the first year of FRACTAL*? Trends were noticed in responses to the first and second question; which are displayed in the graphs below (with a full list of responses presented in Annex E). Because of the variety of responses to the third and fourth question, these answers are listed below the graphs.





What should be changed for the next event?

- A quick chat with the beginners to help them get onto the same page as some of the participants are very advanced in the project steps/information.
- Include breaks during the morning and afternoon.
- Need more city representation
- Better technical setup
- Include the presentation of 'concept notes' coming out of the different groups for discussion.
- Clusters to develop reflections and the way forward to the imbizo and then use the imbizo to present these to the other clusters/partners for discussion.
- Sharing of all slides/presentations (digital or hardcopy). Feedback from cluster chairs should be given on a template of the work plan. This way it is easier to access what was done in relation to the work plan.
- If possible, more people face-to-face, virtual attendees is difficult. Know budget is the issue.
- Be clearer where city practitioners should sit/attend/contribute. Use the opportunity to get more information from them to influence FRACTAL.
- More cross-cluster interactions (less within cluster interactions).
- More online participants (as necessary)
- More focus on links to other FCFA projects – especially needs and demands on CCKE unit.
- Test the technology (Blue jeans) well in advance to avoid unnecessary interruptions.
- More focus – more report back – a better idea of: progress; problems/challenges; plans and ways of overcoming challenges (all need to be more visible).
- If there are going to be Skype sessions in future, there needs to be quieter breakout rooms.
- First heard about the braai after the workshop was on Wednesday and not mentioned in the meeting so it felt very unclear and therefore unwelcoming. Will it happen?
- Make sessions short with good presentations and more interactive discussions.

- Provide internet access
- Distil key points for technical “scientific” sessions.
- 2 day meeting with overnight accommodation.
- Open space working group (parallel)
- More time for reflections and working on issues in depth.
- Finding creative ways to foster transdisciplinary exchange.
- More creative and encouraging activities.
- More advanced warning/invite to participate.
- Use the ‘Third space’ and TD language more explicitly.
- Use flipcharts to collate ideas (suggestions).
- Don’t over pack the agenda.
- Have clusters identify more details and near term deliverables that are publishable science – rebalance the expenditure of effort between stakeholders engagement and intellectual issues.
- Pre-meeting homework.
- Share annotated agenda for comment and input prior to finalization.
- People talking should be aware that they are speaking to remote participants.
- Questioners to be audible to remote participants – people talking from “the floor” could not be understood, either individually or when in discussion.
- Remote participants to be invited to ask questions – system for putting hands up.
- Flipchart sheets to be placed on a board where they are still and flat and not being held so they move and are not all in focus.
- Make sure people understand where the camera is so that they do not obscure the view of slides/white board etc. for remote participants.
- A dedicated “remote participant support person” in the physical meeting.
- A designated person to chair discussions for the online group, just like in a conference call.
- Better use of conversations on Blue jeans.
- More insights from the city people – how well are they actually engaged in the research?

Any interesting moment of learning in the <u>first year</u> of FRACTAL?

- The discussion sessions gave an opportunity to learn about different views/ways of thinking among the groups.
- Learning priorities of city governments in Tier 1 cities. Looking forward to more engagement.
- The different use of terminology for social and physical scientists hypothesis – presumptions.
- Realizing and defining the role we each play.
- Trips to the cities were extremely insightful. They are doing amazing work and facing significant challenges. Need to think about better ways to share these experiences with FRACTAL partners more broadly (not just trip reports/reflections).
- Interdisciplinary nature within FRACTAL.
- Friendly group to associate with even at social level.
- Leadership and good ideas don’t all emanate from academics.
- To realize that the complexity on city level varies so much, and that face-to-face contact is crucial to build relationships.
- Good to take time at the beginning: “take the time it takes, so it takes less time”.

- Learnt a bit on climate change/climate science and FRACTAL as a new member to the team.
- Appreciated the exposure to a diverse set of online communication tools to connect with a very diverse group.
- Big plans are made in the office.
- Going to a workshop and talking to people changes perspectives.
- Pushing oneself to learn about developing a common language.
- Working with co-authors on the working paper to really think through and grapple with what some of the big ideas/concepts mean and inter-relate and shape the work and activities done in FRACTAL. Key process lesson: writing together really sharpens ideas and surfaces differences and requires finding acceptable compromises, more than talking together does.
- Gaining insight into the operational modalities of city decision makers.
- How difficult it is to engage decision makers with scientists.
- The value of well-structured (i.e. planned, moderated, inclusive, reflective) interactions, especially in a multi-disciplinary project environment.
- It was a very productive to sit around the table for 45 minutes in Stockholm during the CORDEX meeting – possibly the most productive 45 minutes of the year for the climate information cluster, demonstrating the value of focused discussions in person. Replicating this through online/calls requires an even more precise focus with clear objectives for the call to guide discussions.

Also during the reflection session, attendees were invited to write down three words that come to mind when thinking about FRACTAL. These words were used to develop the wordcloud (see Figure 2 below), which illustrates that thinking around “climate”, “decision”, cities and “transdisciplinary” is prominent within the FRACTAL team.

Figure 2. FRACTAL wordcloud

Session 10: Closing remarks

Chris Jack closed the day during Session 10 by reflecting on what had been discussed/achieved during the imbizo. Chris emphasized the link between the FRACTAL project and team, and the subjects that FRACTAL is tackling, particularly with regards to complexity. FRACTAL is made up of a large pool of actors with very different backgrounds, and we need to account for the different value systems and agendas – why and how is each person doing what he/she is doing? There are also different degrees of connectivity, and loud and soft voices in FRACTAL – how do we hear the soft voices which are equally as important? Importantly, there is no central command/control, which means that in a way it is very similar to many social systems in which we are working; FRACTAL has been emergent. An Important/exciting aspect highlighted by Chris is the learning process that we are institutionalizing within the project. For him, and many others, it is a new experience to learn about and reflect on what we are learning within the team. Leading and reporting on such a process can be difficult but we need to understand that the emergent behavior works very well and actors are passionate. During the day, Chris witnessed a lot of passion, and it is inspiring to see that people are keen to see and bring about change.

Take home messages and next steps

This report is rich in information that will be used to guide project planning in Year 2 and thereafter. Certain parts or sections of the report might be of particular relevance to different groups of people or organisations. However, to facilitate a smooth and aligned planning process, the “take home” messages

and actionable steps for the FRACTAL project team are described in the table below (according to sessions).

Session 1

Most of the **external and internal factors that influence the evolving project trajectory** are likely to remain relevant throughout the project lifespan. Action steps for capitalizing on/managing these factors are presented below and will be integrated into the ever-developing FRACTAL governance document. These factors should be considered further during project planning (particularly at cross-cutting and cluster meetings) and ideas to capitalize on/manage the factors expanded.

Two aspects that influence the evolving project trajectory			
External factors		Internal factors	
Factor	Means to manage factor	Factor	Means to manage factor
New initiatives (e.g. IPCC 1.5deg Special Report)	• Integrate into project plans (e.g. climate information cluster) and generally be aware of relevant initiatives (cluster co-chairs and individuals)	Silo'd research and/or contested ideas	• Facilitate ongoing communication (PRC and cluster co-chairs) • Create spaces for dialogue (PRC) • Share results and learning experiences (PRC, cluster co-chairs and individuals)
Changing contexts (e.g. World Bank facility to inform investment)		Dead-ends and non-productive avenues	• Maintain flexibility (and a sense of humor) and remember the nature of the cutting-edge work in which we are engaging. • There is a need to consider shorter-term research agenda (cluster co-chairs) • There is need to consider what it means to work with an incomplete answer (to be discussed at annual event)
Advances made by others in the scientific community / consortia	• Keep regular communications with other consortia (PRC, PI and individuals) • Share relevant information with scientific community/other consortia (PI, PRC and individual team members) • Acknowledge and integrate advances into project plans (cluster co-chairs)	Challenges that prove more complex than anticipated	
Accelerating interest by other cities / researchers	• Develop and maintain an association or community of FRACTAL (PRC and PI)	Logistical hurdles and difficult experiences	
Expectations and framing by funders	• Be aware of (and manage) expectations from funders, particularly where they differ from expectations from team members (PI and PRC)	Necessity to reframe based on emergent understanding	
		Language, terminology, and misunderstanding	• Glossary of terms/acronyms for each cluster (PRC)

			• ASK QUESTIONS (individual) • Make an effort to understand others • Reflect on your world views, how they are shaped and what they mean (individual)

Session 2
The content of presentations during session 2 provided a comprehensive overview of the complexity of modern day problems (such as those that FRACTAL is tackling), building resilience to overcome these problems, the reasons for applying an innovative TD/co-production approach, and considerations for individual team members (and the FRACTAL team as a whole) when working towards a TD approach. The ideas presented during this session (**complexity/resilience/TD/co-production**) form the foundation of the FRACTAL research and team dynamics, so it is important for team members to think around these concepts, what they mean and how they can be applied.
Session 3
The outputs from session 3 will be used to further develop the FRACTAL ToC, develop FRACTAL indicators (**how do we measure success as a team?**), and align these with the FCFA indicators.
Session 4, 5 and 6 (including reflections from Year 1)
The outputs from session 3 should be read and digested by all team members to facilitate a **common understanding** of where we're at, what we've achieved, and where we'd like to go (Table 4 presents a comprehensive overview of each cluster). The information presented in the third column of table 4 (overarching tasks: Year 2) presents an opportunity to identify cluster synergies during Year 2. This information will feed into the planning for Year 2 (template to be provided).
Session 7
Session 7 builds on from sessions 4, 5 and 6 and should be used to **inform planning** within clusters for Year 2. It will be beneficial to read the plans/ideas across all clusters to (again) identify cross-cluster synergies and areas for collaboration. Similarly to feedback elicited during sessions 4, 5 and 6, this information will feed into the planning for Year 2 (template to be provided).
Session 8
The **governance** document that has been developed for FRACTAL will likely continue to evolve throughout the project. Feedback on this document from all project partners will be greatly appreciated.
Session 9
Session 9 will be used to assess **learning** in the first year of FRACTAL and **guide the planning for the annual event** (and others to follow). The wordcloud presented in this session report back provides a **good overview of the feelings/ideas** team members have regarding FRACTAL.
Session 10
The ideas presented in session 10 are relevant for FRACTAL throughout the lifespan of the project, and should be reflected on/considered by all project team members.

ANNEX A: Imbizo attendees

#	Name	Institution/organisation	Cluster	Physical/virtual attendance
1	Anna Taylor	UCT	City learning (Co-chair)	Physical
2	Arun Rana	SMHI	Climate information	Virtual
3	Bettina Koelle	Red Cross Red Crescent Climate Centre	City learning (Co-chair)	Physical
4	Bruce Hewitson	University of Cape Town	Climate information	Physical
5	Chantal Taylor	University of KwaZulu-Natal in partnership with eThekwini municipality	X	Physical
6	Chris Lennard	CSAG	Climate information	Physical
7	Christpher Jack	CSAG	Climate information (co-chair)	Physical
9	Di Scott	ACC	Nexus (co-chair)	Physical
10	Eddie Jjemba	Red Cross Climate Centre	City learning	Physical
11	Genito Maure	Eduardo Mondlane University	City learning	Virtual
12	Gina Ziervogel	EGS and ACDI, UCT	X	Physical
13	Izidine Pinto	UCT-CSAG	Climate information	Physical
14	James Cullis	Aurecon	Nexus	Physical
15	Jean-Pierre Roux	SouthSouthNorth	X	Physical
16	Jess Kavonic	ICLEI Africa	City learning	Virtual
17	Jessica Lee	UCT	X	Physical
18	Joe Daron	Met Office	Climate information	Virtual
19	John Mfune	University of Namibia	City learning	Virtual
20	John van Breda	CST Stellenbsoch	X	Physical
20	Juliana Come	Embedded researcher - Maputo	X	Physical
21	Julie Arrighi	Red Cross Red Crescent Climate Centre	City learning	Physical
22	Meggan Spires	ICLEI Africa	City learning	Physical
23	Monica Coll Bessa	SEI Oxford Centre	Decision-making	Virtual
24	Mulimba Yasini	Lusaka City Council	X	Physical
25	Olavi Makuti	City of Windhoek	X	Physical
26	Raul Chilaule	Maputo Municipality	X	Physical
27	Rebecca Ilunga	Aurecon	Nexus	Physical
28	Richard Jones	Met Office Hadley Centre	Climate information	Virtual
29	Rika Preiser	CST Stellenbsoch	X	Physical
30	Ruth Butterfield	SEI Oxford Cnetre	Climate information	Virtual
31	Sarah Schweizer	START	Decision-making	Virtual
32	Skye McCool	City of Cape town: Environmental Policy and Planning	City learning	Physical
33	Sukaina Bharwani	SEI Oxford	Decision-making	Virtual

ANNEX B: Imbizo programme

Coffee and registration of participants
08h30-09h00

Session 1: Opening and welcome remarks: aim and structure of the day	
09h00-09h10	
Facilitator	Bruce Hewitson
Rapporteur	Carla Peterson
Short overview	This short opening session will be used to set the tone of the day. The opening will also include a short introduction to John van Breda and his session on complexity, resilience and transdisciplinarity relevant to FRACTAL.
Structure of the session	TBD
Main aims	● Set the tone for the imbizo ● Provide information on the order of the day, and what participants can expect to learn from/contribute to the imbizo
Outcomes from the session	All participants (physical and virtual) understand the order of events and the planned outcomes for the day
Outputs from the session	N/A
Virtual tools	BlueJeans: webinar to view introduction

Affirming teamwork activity (TBD)
09h10-09h20 (Bettina Koelle)

Session 2: Complexity, resilience and transdisciplinary in the context of FRACTAL	
09h20-10h00	
Facilitator	Mr John van Breda (CST Stellenbosch)
Short overview	Dealing with the climate-related problems faced by developing city-regions in Southern Africa with the objective of building resilience requires constant consideration of the complexity of the systems (including climate, ecological, social and spatial) at play. Complexity theory acknowledges the limitations of traditional scientific methods of producing knowledge that are founded in a reductionist paradigm[3]. In line with this consideration, attempts to solve such problems necessitate shifts in personal and team-based approaches. Such attempts include the transdisciplinary learning and knowledge production processes that are being implemented through FRACTAL to facilitate decisions for resilient development pathways. During this introductory session, Dr John van Breda from the Centre for Complex Systems in Transition (CST Stellenbosch) will remind us of basic complexity theory, and facilitate discussion around transdisciplinary learning in the context of FRACTAL.
Aims/objectives	• Present an overview of complexity theory and resilience relative to FRACTAL • Discuss the complexity of FRACTAL's targeted boundary areas: Southern African cities • Describe knowledge types, skills and epistemological shifts that should be considered/included in transdisciplinary learning processes

[3] Audouin, M. et al. 2013. Exploring the implications of critical complexity for the study of social-ecological systems. Ecology and society 18(3): http//dx.doi.org/10.5751/ES-05434-180312.

Outcomes from the session	Project partners build a common understand of the complex nature of FRACTAL, aspects that should be considered when working at the complex city-region scale to facilitate resilient development pathways, and the requirements for effective transdisciplinary working processes to deal with complex problems.
Outputs from the session	Blog on complexity and TD in relation to FRACTAL (TBD)
Links/resources	Audouin, M., R. Preiser, S. Nienaber, L. Downsborough, J. Lanz, and S. Mavengahama. 2013. Exploring the implications of critical complexity for the study of social-ecological systems. Ecology and Society 18(3): 12. DOI: http://dx.doi.org/10.5751/ES-05434-180312 Dahlberg, R. 2015. Resilience and Complexity: Conjoining the Discourses of Two Contested Concepts. Culture Unbound 7. DOI: 10.3384/cu.2000.1525.1572541 Poli, R. 2013. A note on the difference between complicated and complex social systems. Cadmus 2(1). Available online at: http://cadmusjournal.org/
Virtual tools	BlueJeans: webinar to view introduction

Session 3: cross-cutting session: evolution of FRACTAL: aims, objectives, research questions and Theory of Change (ToC)	
10h00-11h00	
Facilitator	Alice McClure
Rapporteur	Carla Peterson
Short overview	During the cross-cutting session, the FRACTAL aims, objectives and research questions (and evolution of these from the proposal/inception workshop/present) will be briefly revisited. The current FRACTAL pathways of change will be further developed through a participatory process.
Main aims	● "Zoom out" on the project; discuss and align overarching objectives. ● Revisiting (and further developing) the FRACTAL pathways of change – towards a more developed Theory of change (ToC).
Structure of the session	1. Revisiting aims, objectives and research questions (10 minutes) 2. Explanation of participatory process to further develop the pathways to impact in the Theory of Change (5 minutes) 3. Breakaway session to assess outcomes in the FRACTAL ToC (20 minutes). Breakaway groups will be guided by worksheets (the virtual group will use a template that has been set up in Google drive) 4. Feedback from breakaway sessions (25 minutes). Representatives from each breakaway group will share information that has been developed while assessing outcomes in the pathways to impact. This information will be entered into the Google drive template by Alice McClure. *Morning tea will also be served during this session*
Outcomes from the session	● Overarching vision of where FRACTAL is going, and how to get there ● Identification of/ideas relative to each outcome in the FRACTAL ToC: i) potential indicators for outcomes; ii) targeted stakeholders/system (who/what/how are we expecting change); iii) how much do these stakeholders/systems need to change to have successfully reached the indicators; iv) how long do we expect this change to take; and v) what challenges might we face in the real world.
Outputs from the session	● Table of documented ideas to support operationalizing outcomes on the pathway to change
Links/ resources	http://www.theoryofchange.org/what-is-theory-of-change/ FRACTAL overarching aims and objectives template

	http://www.dochas.ie/Shared/Files/4/TOC_fac_guide.pdf FRACTAL Theory of Change Future Climate For Africa (FCFA) Theory of Change FCFA logframe ASSAR Theory of Change (example of a visual ToC)
Virtual tools	● BlueJeans: webinar to view session, and to communicate among the virtual group during the breakout session. ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process ● Google drive: table of documented ideas to check research questions and operationalize outcomes ● Physical representative: voice of the virtual group

Session 4: Progress from Year 1 (all research clusters – 10 minutes each)	
11h00-11h45	
Facilitator	Chris Lennard
Rapporteur	Alice McClure
Short overview	Co-chairs from clusters of collaboration will share information on main activities and progress within each cluster during Year 1.
Structure of the session	1. Description of the session (5 minutes) 2. Representatives from clusters of collaboration (co-chairs) will present their progress in a format that they feel comfortable with: • City learning cluster (10 minutes) • Climate information cluster (10 minutes) • Decision-making cluster (10 minutes) • Nexus cluster (10 minutes)
Main aims	To build a common understanding, across clusters, of what has been achieved during Year 1
Outcomes from the session	Increased learning and energy for transdisciplinary research (motivation) through communication related to progress of disciplinary and transdisciplinary research
Outputs from the session	Updated “special edition” FRACTAL digest/newsletter (Carla Peterson)
Links/ resources	Year 1 Workplans: i) City learning; ii) Climate information; iii) Decision making; iv) Nexus
Virtual tools	● BlueJeans: webinar to view session, and for representative from the decision-making cluster to provide feedback ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process

Session 5: Challenges faced within clusters and ideas to overcome these challenges (all research clusters – 10 minutes each)	
11h45-12h30	
Facilitator	Chris Lennard
Rapporteur	Alice McClure

Short overview	Cluster co-chairs will describe the main challenges faced during Year 1 of implementing activities, and whether these challenges are likely to be faced going forward. Suggestions to overcome these challenges will also be discussed.
Structure of the session	1. Overview of the feedback session (5 minutes) 2. Cluster representatives will provide feedback during this session, which will be entered into a "challenge table" (using Google drive). This challenge table will be shared on the screen for all physical and virtual attendees to see, and will facilitate the process of identifying common challenges between clusters, and will avoid repetition. • Decision-making cluster (max 10 minutes) • Climate information cluster (max 10 minutes) • Nexus cluster (max 10 minutes) • City learning cluster (max 10 minutes)
Main aims	Identify challenges within and between clusters, and means to overcome these challenges
Outcomes from the session	Increased understanding of challenges faced within and between clusters, and means to overcome these challenges
Outputs from the session	Challenge table (input into risk table) (Alice McClure)
Links/ resources	Template: challenge table
Virtual tools	• BlueJeans: webinar to view session, and for representative from the decision-making cluster to provide feedback • Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process • Google drive: challenge table • Physical representative: voice of the virtual group

Session 6: Overarching plans for Year 2 to be fleshed out in session 7	
12h30-13h15	
Facilitator	Chris Lennard
Rapporteur	Alice McClure
Short overview	During session 6, cluster co-chairs will present overarching/higher-level plans for Year 2. These plans should be informed by discussions within particular clusters of collaboration prior to the imbizo.
Structure of the session	1. Overview of session (5 minutes) 2. Representatives from clusters of collaboration (co-chairs) will present their plans in a format that they feel comfortable with: • Nexus cluster (10 minutes) • Climate information cluster (10 minutes) • Decision-making cluster (10 minutes) • City-learning cluster (10 minutes) While these representatives are presenting their plans, the bulk tasks/main activities that have been identified for Year 2 will be entered into the wokplan template by Alice McClure, which will be further fleshed out in session 7.
Main aims	Begin thinking around plans for Year 2
Outcomes from the session	Increased understanding of planned cluster research and activities, and identification of task interdependencies.

Outputs from the session	Bulk tasks to be entered into participatory work planning template (refined through Session 7)
Links/ resources	Year 1 Workplans: i) City learning; ii) Climate information; iii) Decision making; iv) Nexus
Virtual tools	● BlueJeans: webinar to view session, and for representative from the decision-making cluster to provide feedback ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process

Brown bag lunch
13h15-13h45

Session 7: Facilitated planning for Year 2 Informed by Statements of Work, and information gathered during Sessions 3-6	
13h45-15h15	
Facilitator	Alice McClure (CSAG)
Rapporteur	Each cluster will nominate a representative to fill in the Google drive table
Short overview	Session 7 will bring together the information from Statements of Work (developed before the Imbizo), session 2 (further development of FRACTAL pathway of change) and the feedback from the clusters of collaboration (sessions 4-6) to begin planning for Year 2.
Structure of the session	1. Overview of the planning exercise (5 minutes) 2. Each cluster will work on the Google doc template, which will be filled in during this session so that virtual attendees can observe and contribute to progress (1 hour). Virtual attendees will communicate through slack channels for clusters of collaboration. 3. Cross-check of cluster plans (25 minutes). All participants will check the entries in the Google drive table, and discuss. **Afternoon tea will be served during this session**
Main aims	● Identify and assign bulk tasks for year 2 to clusters as a basis for developing detailed cluster work plans (and sub-tasks if possible)
Outcomes from the session	Improved understanding of research frameworks, interdependencies and responsibilities
Outputs from the session	● First draft of a workplan for Year 2, including tasks, contribution to impact pathways, milestones, owners of and contributors to the tasks, timelines, resources involved and dependencies/links (clusters)
Links/ resources	Year 1 Workplans: i) City learning; ii) Climate information; iii) Decision making; iv) Nexus Comparison: proposal tasks and Year 1 tasks Template: collaborative workplan template Statements of Work (SoWs) and priority interests from project partners found here
Virtual tools	● BlueJeans: webinar to view session ● Slack: cluster channels to communicate among the clusters ● Google drive: collaborative workplan template

Session 8: Discussion and case study experiment around FRACTAL governance	
15h15-15h45	
Facilitator	Alice McClure

Rapporteur	Carla Peterson
Short overview	A draft FRACTAL governance document has been developed for comment. During session 8, open book experiments will be undertaken on the suggested decision-making processes and strategies for effective governance that are described in this document.
Structure of the session	1. Overview of experiment process (5 minutes) 2. Breakaway groups: 3 groups of 4; 1 group of 5; 1 online group (10 minutes) 3. Discussion on experiment (15 minutes)
Main aim	Spark discussion around FRACTAL governance
Outcomes from the session	Alignment of organizational practices and routines
Outputs from the session	Comments on governance document
Links/ resources	FRACTAL Work in Progress governance document
Virtual tools	● BlueJeans: webinar to view session ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process ● Physical representative: voice of the virtual group

Session 9: Learning framework, presentation of Year 1 reflections, and reflection on imbizo learning process	
15h45-16h45	
Facilitator	Bettina Koelle
Rapporteur	Anna Taylor
Short overview	During this session, ideas for monitoring and evaluating learning will be presented, along with the initial reflections from Year 1 of FRACTAL. This session will also be used to reflect on the learning process during the Imbizo.
Structure of the session	TBD
Main aim	Explore and implement the FRACTAL learning framework
Outcomes from the session	Improved understanding of the evaluation mechanism for learning and transdisciplinary research (alignment of organizational practices and routines)
Outputs from the session	Feedback on the learning process from the Imbizo
Links/ resources	N/A
Virtual tools	● BlueJeans: webinar to view introduction ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process ● Physical representative: voice of the virtual group

Session 10: Final questions and closing remarks	
16h45-17h00	
Facilitator	Chris Jack
Rapporteur	Alice McClure
Short overview	The last session of the day will be used for closing questions, comments or discussion points.

Structure of the session	1. Attendees will be provided the opportunity to pose final questions or remarks for discussion. 2. Chris will close the day and present order for the Shisa Nyama.
Main aim	Team members are provided the opportunity to raise any final discussion points/comments, and close off the day.
Outcomes from the session	All attendees are comfortable with the proceedings from the day and feel comfortable to close the day
Outputs from the session	N/A
Links/ resources	N/A
Virtual tools	● BlueJeans: webinar to view session ● Slack: Imbizo channel to communicate among the virtual group and comment on the virtual imbizo process

ANNEX C: Feedback from clusters

Cluster feedback: Year 1

City learning
• All Tier 1 cities were visited and relationships were built with city partners and prospective stakeholders • Representatives from Tier 1 cities attended the CSAG Winter School, along with the Embedded Researcher (ER) from Lusaka and the potential ER from Maputo • Five city background reports were developed in Year 1. These will feed into the climate information cluster • A meeting was convened with self-funded cities: Cape Town, Durban and Johannesburg • A briefing note, draft plan and schematic diagram have been developed for the Learning Lab process • A number of cluster team members are involved in developing two working papers that describe the city learning & FRACTAL framing concepts • A graphic overview for the Monitoring, Evaluation & Learning (M, E & L) framework and practices has been drafted • Synergies are being developed with other clusters (e.g. decision methods review to guide work of ERs) • Engagement between Tier 1 & tier 2 cities has been initiated through GEC proposals • Draft 0 of the Tier 2 City MoUs have been developed and sent to city focal points • MoU and sub-contracts have been signed for Lusaka, and are close to signature in Windhoek. The MoU for Maputo has been signed • Learning Lab plans and guidance documents have been drafted, they will soon be circulated for inputs; these documents include templates to gather information about resourcing the Learning Labs from all the partners, which will be integrated into broader resource planning • Four cities that will host ERs in various stages of recruitment, i.e. Durban shortlisted, Lusaka has committee to shortlist that will convene once sub-contract is signed, Maputo has ER candidate identified but can only contract once sub-contract signed, Windhoek will advertise once sub-contract signed
Climate information
• The FRACTAL climate information working framework has been developed • Climate scientists are comfortable not being leaders in the project – other types of research leading in FRACTAL. However, there has been lots of planning on a conceptual level. • The ideas have been growing in two main directions: i) top-down process understanding – what advances our understanding at this scale. Challenge within climate cluster • A lot of discussion of current understanding of these processes, how do we measure processes? How do process chains interact? Developed nicely from a conceptual level • Distillation – how do we draw value from all the data sources • The climate information work around understanding climate processes has interrogated five questions/themes: i) what is our current understanding? ii) catalogue of processes; iii) catalogue of data sources; iv) how do we index/measure processes? and v) dow do we index/measure process chains? • The development of climate information for decision making has been framed by three main questions/themes: i) can we provide useful information into decision making? ii) how we do quantify/describe the value of different climate information sources; and iii) what are the key contradictions that have consequences for decision making? • City of Cape Town and CSAG are collaborating to develop downscaled climate scenarios and climate narratives that will be the basis of a workshop engagement with multiple line functions
Decision-making

- DM cluster has been engaging with the nexus cluster to develop a draft of the conceptual model of Lusaka city region
- Arrangements are in place for the ACC post-doc to start in September 2016
- Cluster is well underway towards collecting and analysing policy/planning/legislation documents for Tier 1 cities (MSc intern at SEI supporting with dissertation)
- A transdisciplinary concept note has been completed, which has contributed to City Learning Cluster paper on "TD, Co-production and Co-Exploration"
- DM cluster is focusing on taking parts of the conceptual model from a macro level to the local level
- Data and documents from city visits are being collated to start ground-truthing information
- Guidance for ERs on understanding how decisions are being made at city-scale is being developed
- Formal and semi-formal decision support methods for each city are currently being reviewed
- Review and catalogue of adaptation options for Lusaka is ongoing.
- Connections with SEI WEAP (and potentially LEAP) models in Zambia and Namibia are being created.
- A Small Opportunity Grant (SOG) proposal to use Climate Change and Capacity Diagnosis (CCAD) tool is currently being developed
- Contributing to City Learning Lab cluster work and the M, E & L framework.
- Developing links between FRACTAL and new SEI Initiative on Climate Services.

Nexus

- Mandate has evolved:
  - initially was "Baselines cluster" – meant to systematize "non-climatic" information base for cities
  - geared towards answering a range of questions
  - bridging the gap between science and policy
  - relevant physical information
  - relevant climate information
  - role of local-regional dependencies
  - create an entry point for climate information group, identify a tangible water-energy issue that is important for the city that can be "unpacked" by the project
  - renamed "Nexus" and self-tasked with trans-dysciplinary processes at the interface of other clusters

- Developed a draft conceptual model of the city-region system of Lusaka: this is a heuristic model which illustrates the complexity of the system. The model described above will be used as a platform for:
  - interaction between "sciences"
  - discussion and reflection within TD landscape
  - engagement with decision-making processes
  - presented at LuWSI/Fractal workshop in Lusaka

- Currently zooming in onto the conceptual, heuristic model to interrogate a connection (climate-related, hydrology etc.)
  - Have established a strong connection with Lusaka Water Security Initiative (LuWSI): possibly "our man in Lusaka" supplementing embedded researcher. LuSWI is a GIZ funded project focusing on water security in Lusaka.
  - at this stage – no platform for the meaningful use of system's approach
  - focus shifted towards identifying "tangible" water security-oriented issue with critical decision space
  - Kafue as water source – its CC vulnerability/resilience
  - Local groundwater – vulnerability/resilience

- groundwater vs. Kafue as water source – strategic decision taken earlier

- Have been thinking around the idea of transdisciplinarity:
  - an exemplar of TD process in the Nexus cluster will be important and useful, extension of TD throughout the entire project - needs to be mainstreamed throughout FRACTAL (drawing from the concept note on TD)
  - contribution to City Learning cluster - TD learning: "Co-exploration, Co-Production and Transdisciplinarity"
  - Conceptualising a platform for documenting TD processes

General/overarching challenges

General/overarching challenges

- Long process for establishing local partnership agreements – MoU & sub-contracts – held up Learning Labs & recruitment of
- Translation requirements in Maputo
- Difficult finding & maintaining synergies with climate info cluster – cross-cluster reps; cross-cutting cluster
- Balancing / navigating multiple needs, demands, values, objectives within the project (scientific; technical; political; admin…)
- Lack of face-to-face communication. Communicating with partners at different institutions and in different countries.
- How to avoid retreating to the disciplinary safety and stay in the "3rd space"?
- Organizational placement & positionality of local partners & ERs – access to decision-making spaces and processes
- Building convening power – getting the 'right' people to the Learning Labs (repeatedly) – city visits
- How to engage and work with Tier 2 cities & self-funded cities – grants
- How to narrow down and target 'burning issues'
- How to connect and engage with stakeholders beyond city government
- How to capture learning and learn about learning
- How to work together effectively in TD ways without suffering from meeting / talking overload & withdraw – how to design & monitor TD aspects / processes throughout the project
- staying true to the project's principles
- be need-driven, but remain within project's scope
- avoid "extractive"/"safari" science, crate win-win setting
- negotiate workshop and project fatigued community
- negotiate politically-charged landscape
- How to meaningfully engage in cities?

Cluster-specific challenges

CL: Dealing with tensions, instabilities and discontinuities, within and between teams & organizations (local govt elections)
CI: Information needs guided science is hard when you don't know what the information needs are!
CI: There are significant technical challenges involved in data analysis and modeling, do we invest time and resources into an activity that is not going to be useful
CI: We are operating in a complex landscape of "climate services" – many people providing information into decision making in one form or another. Contested, complex landscape that is very difficult to operate in.
CI: Different approaches and/or "beliefs" about climate science, climate modeling, and information. What is good information? What is bad information? Also a real opportunity – need to figure out how we intend to overcome them.
DM: Have not been able to review background documents for Tier 1 cities with city partners.

DM: Have not been able to start preliminary decision pathway analysis.
DM: Most decision-making work has been delayed.
DM: In collaborating with the Nexus cluster, it is difficult integrating the governance arrangements of each city into a TD research forum and trying to develop a common language.
DM: Not clear where overlap is between Climate Information and DM clusters in workplan – desire to be needs driven but we need to engage better to achieve this.
DM: Interpreting the policy documents from the T1 cities without the help of the Nvivo for Teams software.

Plans for Year 2

City learning

- Refine & elaborate the learning framework; operationalize practices & techniques to document learning & adjust plans
- Works plans, network and training with embedded researchers, linking across clusters
- Stakeholder / knowledge-holder network mapping (city, regional and global scales), identify influential nodes and important bridging people / orgs – reach out, communicate, engage, share
- Convene Learning Labs (at least 2 per Tier 1 city), linking across clusters
- Identify, refine, distil, prioritize, sequence 'burning questions' – translate between problem statements & research questions (practitioners etc.)
- Facilitate other city learning dialogues between Learning Labs (incl. virtual / online) – does not all depend on learning labs
- Complete Tier 2 partnership agreements
- Facilitate exchange learning visits between Tier 1 and Tier 2 cities and self-funded cities
- Build on, distil, share 2 working papers
- Contribute to designing and implementing the FRACTAL communications and engagement strategy

Climate information

Observed data analysis

- Contradictions between observed datasets
- Sources of contradictions, resolution of contradictions (post-doc contributing to science)

Climate process indexing/analysis

- Identify processes and how to track them/index them
- After identifying processes, assess how they have varied in the past and how process link across time and space scales
- How the processes are represented in different models, can we described model performance?
- Scoping numerical model experiments to answer questions of local feedbacks and convection resolving (complementing IMPALA and UMFULA)

Articulation of climate information needs from the city perspective

- Integration with decision making cluster and city learning cluster
- Integration with Nexus cluster and impact/systems modeling

Production of climate information

- Drawing from process analysis understanding (distillation) and feeding back to climate process analysis
- Communication (narrative approaches?)
- Visualisation

Decision-making

- Finish off tasks from Year 2

- Engage with embedded researcher and understand dynamics
- Plan for a knowledge exchange process between Tier 1 and Tier 2 cities – SOGs
- Work with nexus cluster on models to develop Lusaka, and begin Maputo and Windhoek
- SEI work – complete catalogue of adaptation options for Lusaka/tools for decision making
- Social science fieldwork in three cities – urban post-doc
- Potential demand for concept notes on: i) what resilient cities would look like (based on real world examples), finance mechanisms – move towards implementation from plans and policies; and iii) institutional placements – different municipalities dealing with climate change in different places in municipalities – pros and cons of these approaches.

Nexus

- Start working on actual engagement in Lusaka
- Develop a relationship that we have in Lusaka in other cities

ANNEX D: Images of cluster learning/planning sheets

Learning/reflection sheets

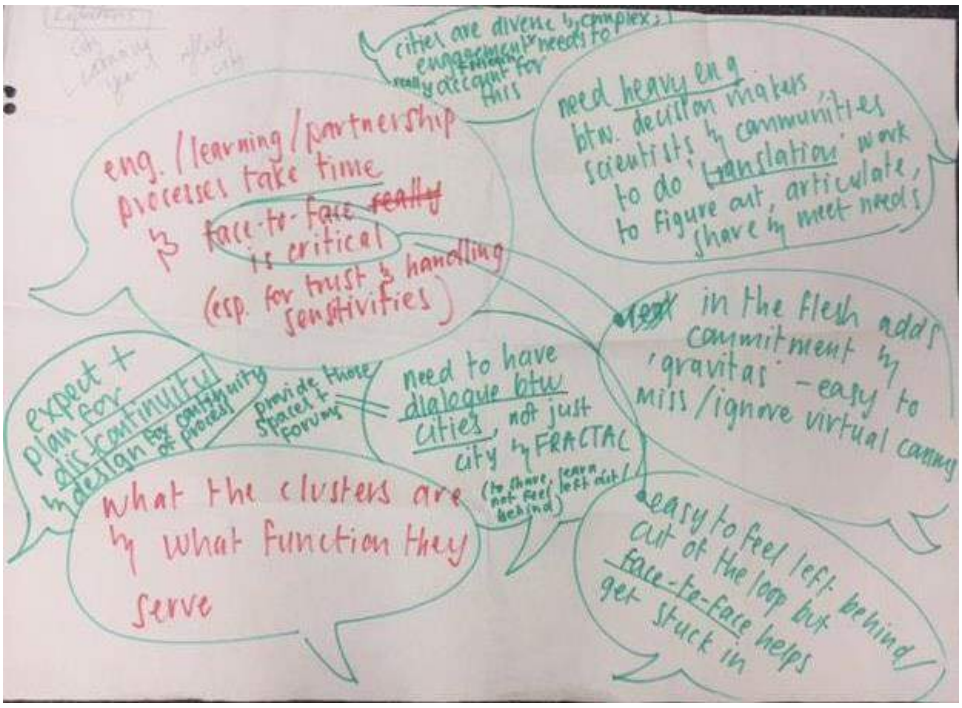


Figure 3. Learning/reflection from city learning breakaway group

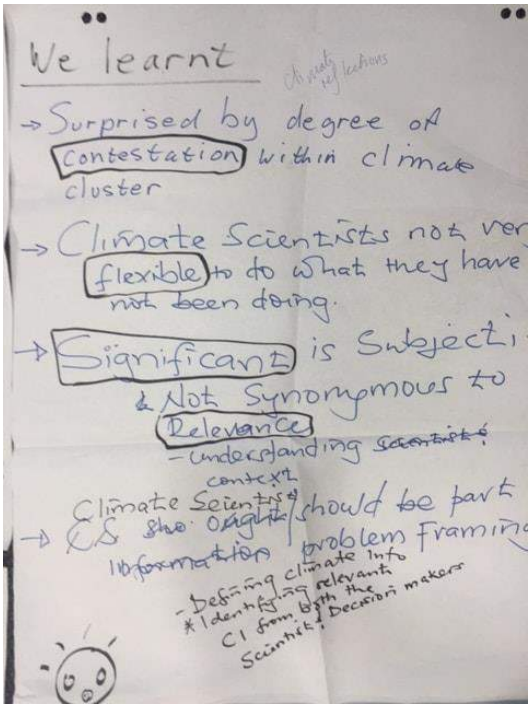


Figure 4. Learning/reflection from climate information breakaway group

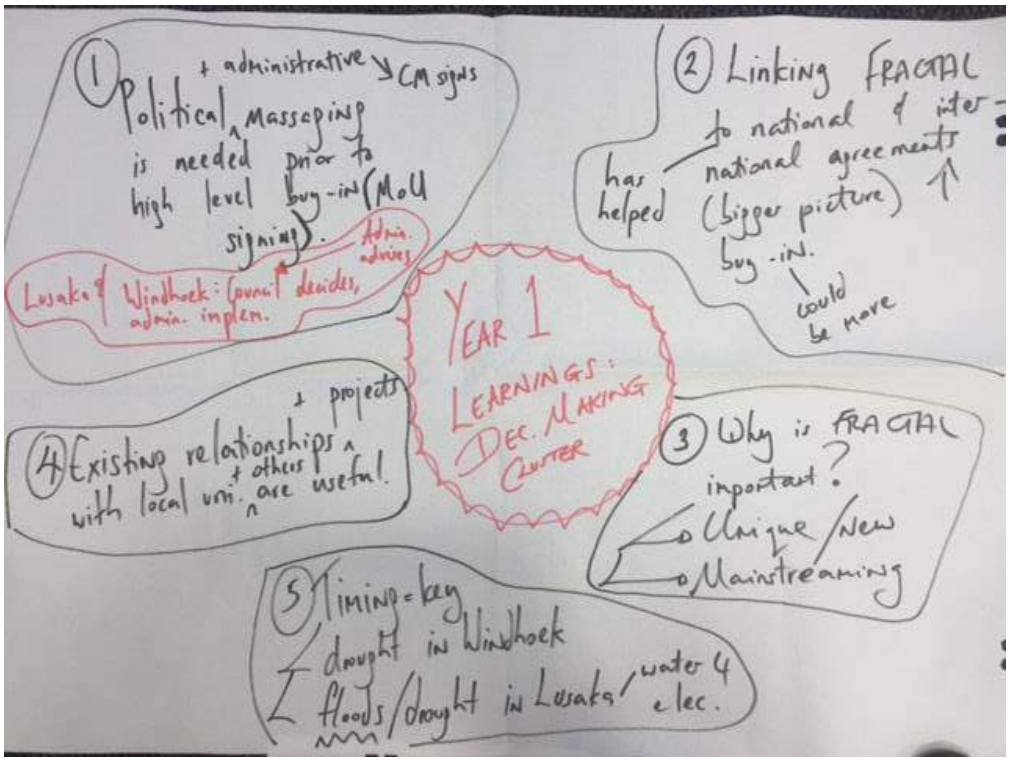


Figure 5. Learning/reflection from decision making breakaway group

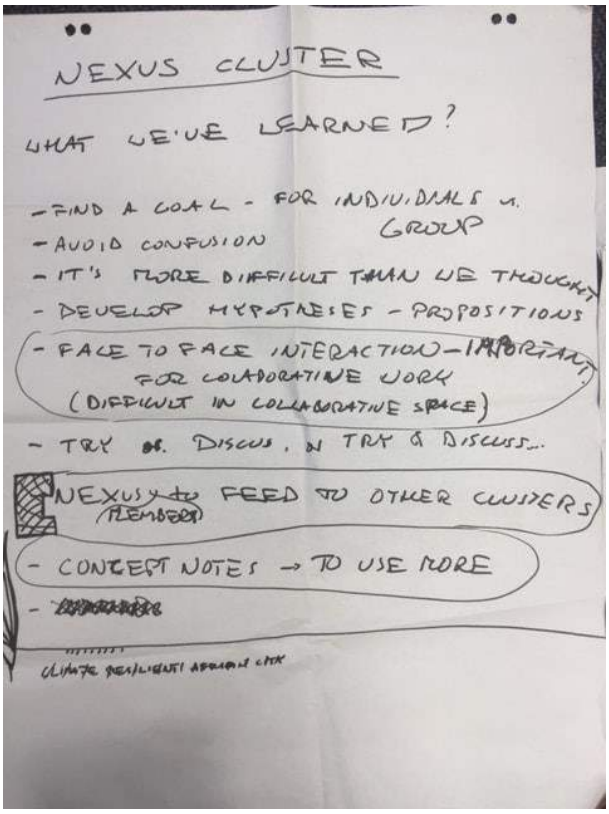


Figure 6. Learning/reflection from nexus breakaway group

Planning sheets

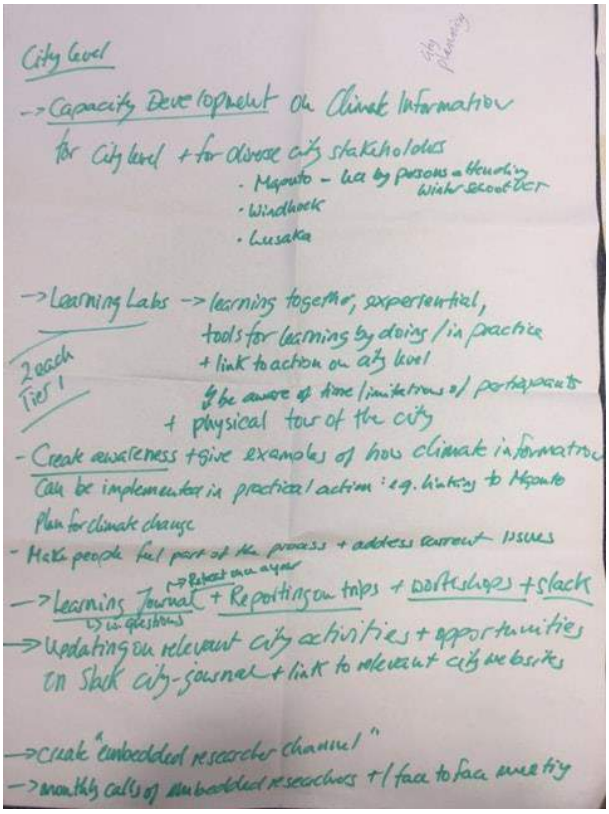


Figure 7. City learning planning sheet

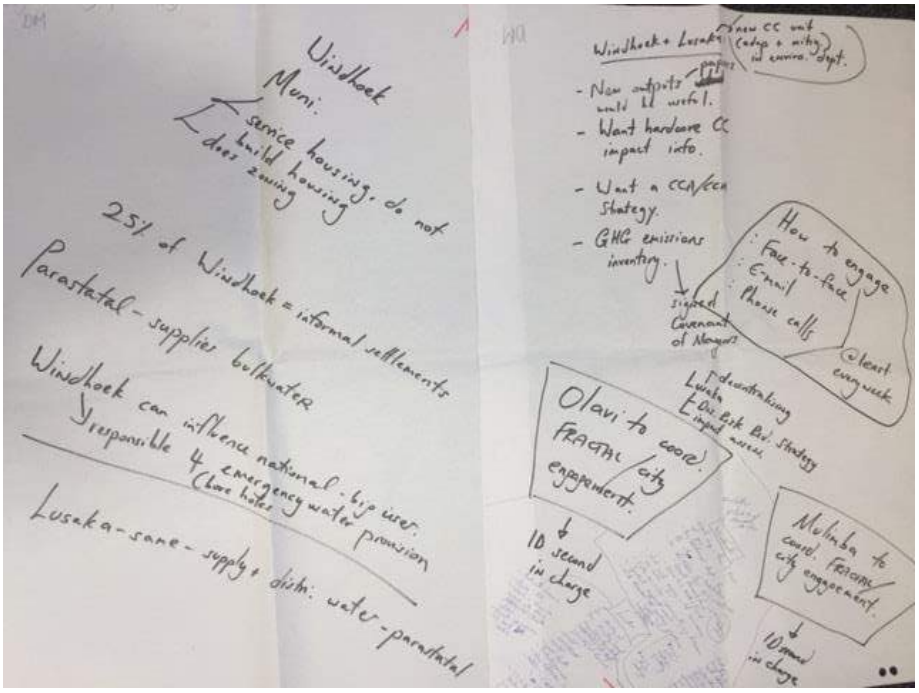


Figure 8. Decision making planning sheet 1

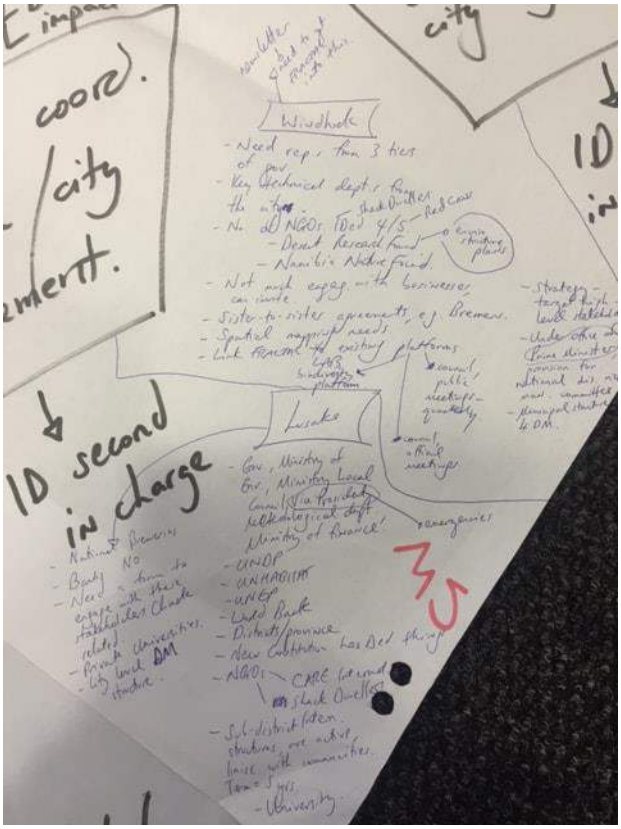


Figure 9. Decision making planning sheet 2

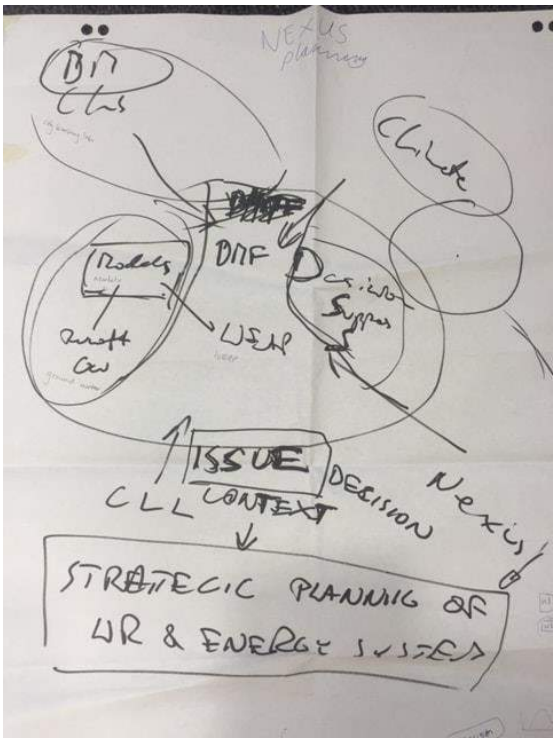


Figure 10. Nexus planning sheet 1

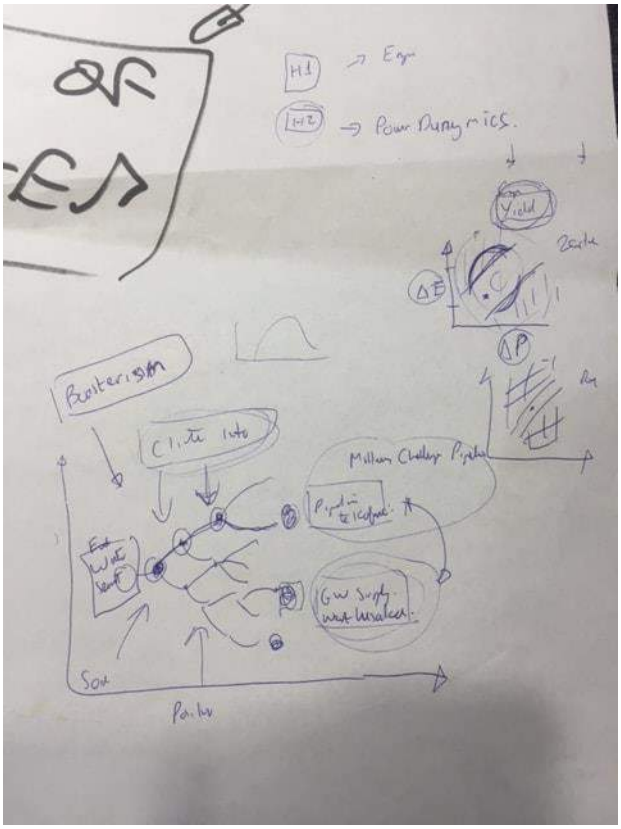


Figure 11. Decision making planning sheet 2

ANNEX E: Responses from reflections and learning exercise

What was good?

- The presentations were very good and the way the participants are engaging with the project (Group work provided a platform to gather more information from attendees).
- Feedback from year 1 was interesting and plans for year 2 looked ambitious but is good as a starting point in the planning process.
- Received a short summary of cluster updates.
- External presentations were interesting but would have been better if they were shorter.
- Nice attendance.
- Getting all the different clusters together and spending time within and across usual clusters.
- Getting a reminder of the FRACTAL objectives.
- Getting some level of approval from the wider group about ideas for the way forward.
- No constraints to outcomes.
- Live editing
- Icebreakers (post-lunch) were useful (energisers)
- The programme for the day was structured but allowed flexibility (organised well with an excellent detailed agenda).
- Refreshments
- Communication including administration (pre-today and during).
- Enjoyed resilience of TD presentation from complexity centre.
- Great to meet many different stakeholders face-to-face. Also, good to see how diverse (and big) the FRACTAL team is.
- Admirable to try and connect virtual attendees so much, despite technical difficulties.
- Opportunity to meet people in a relaxed environment.
- The tone of the meeting was positive, encouraging and very open to sharing.
- Enjoyed Rita and John's presentation. Should have followed up later in the day as an item so as to reflect on how we are embracing complexity and how this project could be made TD in nature.
- Clear explanations about FRACTAL – learning the insights of the FRACTAL project and roles of the clusters (dealt with FRACTAL in a comprehensive way).
- The varied/diverse nature of facilitation between sessions kept the imbizo interesting.
- The concept of learning 'dialogues'.
- Conversation and building one-on-one relationships.
- Testing out the technology so we can think how it could work out better next time.
- Working on Google docs seemed to go well.
- Thanks to Alice for all her work organizing the imbizo and all the stuff that she has been doing on FRACTAL since she came onboard.
- Appreciated those speakers who stayed close to the microphone and were conscious of the online participants by staying on camera.

What was not so good?

- The meeting regarding specifically the sessions a bit overwhelming as this is my second exposure to the FRACTAL project (the first was the pre-imbizo meeting held the day before). In future, spread the programme over two days.

- No breaks during morning and afternoon – please include next time.
- Not enough time for discussions and contributions to the way forward across clusters – no final conclusions/goals were particularly reached e.g. goal time line/outputs.
- Not enough detail of what has been done.
- Not enough time to re-evaluate the key research questions.
- Difficult to plan for year 2 without many of the cluster participants. The year 2 planning was difficult so had a more general chat instead.
- Would love to get more insight into the meat of cluster activities, but perhaps not the right forum. E.g. would like know more about what the climate science cluster does. It would have helped to have the feedback from clusters before doing the template in session 3. Would have felt more familiar with all the activities.
- Not enough time on connections to bigger FCFA issues.
- Still many newcomers who could benefit from understanding the programme as a whole.
- The displays and talks projected – also posters were not legible.
- Quite intense when report backs on each cluster happened. Perhaps standardize reporting or provide bullet points to follow (participants could lose focus if this is not resolved).
- Many sessions therefore not easy to find links between sessions.
- Less group discussions, less interactive sessions.
- No internet access – limited access to the Google docs/dependency on the Google doc s for activities.
- Mix online – face-to-face participation was difficult.
- The programme was very packed and rushed.
- Not enough space for engagement of all partners.
- The roles of the city or municipalities was not very clear.
- Little feedback from the outside (virtual) group.
- Not sure how the information from the TD lectures will feed into FRACTAL.
- Not enough time to network/chat to new contacts.
- It felt rushed in many places which reduces thinking, engagement and connections being made.
- Too much time spent on reporting content that could have been shared in documents for pre-imbizo prep-work.
- Not enough time on breaking down high-level discussions into tasks that are measurable with near term deliverables.
- Responsibilities left to “groups” which allowed individuals to ride?
- Time given for the cluster to present their plans for year 2, and time given for the clusters to describe the challenges during year 1.
- Invites to remote participants to ask questions, provide feedback would have been good – especially for those not able to access or familiar with using the slack channels.
- Needed more guidance in the breakout sessions. The “chat” on Blue jeans was not used to maximum effect.
- Slack is not an effective tool for Met Office participation, though it was appreciated that this is was MO specific issue.
- Some difficulties editing some of the Google docs initially.

What should be changed next time?

- A quick chat with the beginners to help them get onto the same page as some of the participants are very advanced in the project steps/information.
- Include breaks during the morning and afternoon.
- Need more city representation
- Better technical setup
- Include the presentation of 'concept notes' coming out of the different groups for discussion.
- Clusters to develop reflections and the way forward to the imbizo and then use the imbizo to present these to the other clusters/partners for discussion.
- Sharing of all slides/presentations (digital or hardcopy). Feedback from cluster chairs should be given on a template of the work plan. This way it is easier to access what was done in relation to the work plan.
- If possible, more people face-to-face, virtual attendees is difficult. Know budget is the issue.
- Be clearer where city practitioners should sit/attend/contribute. Use the opportunity to get more information from them to influence FRACTAL.
- More cross-cluster interactions (less within cluster interactions).
- More online participants (as necessary)
- More focus on links to other FCFA projects – especially needs and demands on CCKE unit.
- Test the technology (Blue jeans) well in advance to avoid unnecessary interruptions.
- More focus – more report back – a better idea of: progress; problems/challenges; plans and ways of overcoming challenges (all need to be more visible).
- If there are going to be Skype sessions in future, there needs to be quieter breakout rooms.
- First heard about the braai after the workshop was on Wednesday and not mentioned in the meeting so it felt very unclear and therefore unwelcoming. Will it happen?
- Make sessions short with good presentations and more interactive discussions.
- Provide internet access
- Distil key points for technical "scientific" sessions.
- 2 day meeting with overnight accommodation.
- Open space working group (parallel)
- More time for reflections and working on issues in depth.
- Finding creative ways to foster transdisciplinary exchange.
- More creative and encouraging activities.
- More advanced warning/invite to participate.
- Use the 'Third space' and TD language more explicitly.
- Use flipcharts to collate ideas (suggestions).
- Don't over pack the agenda.
- Have clusters identify more details and near term deliverables that are publishable science – rebalance the expenditure of effort between stakeholders engagement and intellectual issues.
- Pre-meeting homework.
- Share annotated agenda for comment and input prior to finalization.
- People talking should be aware that they are speaking to remote participants.
- Questioners to be audible to remote participants – people talking from "the floor" could not be understood, either individually or when in discussion.
- Remote participants to be invited to ask questions – system for putting hands up.
- Flipchart sheets to be placed on a board where they are still and flat and not being held so they move and are not all in focus.

- Make sure people understand where the camera is so that they do not obscure the view of slides/white board etc. for remote participants.
- A dedicated “remote participant support person” in the physical meeting.
- A designated person to chair discussions for the online group, just like in a conference call.
- Better use of conversations on Blue jeans.
- More insights from the city people – how well are they actually engaged in the research?

Any interesting moment of learning in the <u>first year</u> of FRACTAL?

- The discussion sessions gave an opportunity to learn about different views/ways of thinking among the groups.
- Learning priorities of city governments in Tier 1 cities. Looking forward to more engagement.
- The different use of terminology for social and physical scientists hypothesis – presumptions.
- Realizing and defining the role we each play.
- Trips to the cities were extremely insightful. They are doing amazing work and facing significant challenges. Need to think about better ways to share these experiences with FRACTAL partners more broadly (not just trip reports/reflections).
- Interdisciplinary nature within FRACTAL.
- Friendly group to associate with even at social level.
- Leadership and good ideas don’t all emanate from academics.
- To realize that the complexity on city level varies so much, and that face-to-face contact is crucial to build relationships.
- Good to take time at the beginning: “take the time it takes, so it takes less time”.
- Learnt a bit on climate change/climate science and FRACTAL as a new member to the team.
- Appreciated the exposure to a diverse set of online communication tools to connect with a very diverse group.
- Big plans are made in the office.
- Going to a workshop and talking to people changes perspectives.
- Pushing oneself to learn about developing a common language.
- Working with co-authors on the working paper to really think through and grapple with what some of the big ideas/concepts mean and inter-relate and shape the work and activities done in FRACTAL. Key process lesson: writing together really sharpens ideas and surfaces differences and requires finding acceptable compromises, more than talking together does.
- Gaining insight into the operational modalities of city decision makers.
- How difficult it is to engage decision makers with scientists.
- The value of well-structured (i.e. planned, moderated, inclusive, reflective) interactions, especially in a multi-disciplinary project environment.
- It was a very productive to sit around the table for 45 minutes in Stockholm during the CORDEX meeting – possibly the most productive 45 minutes of the year for the climate information cluster, demonstrating the value of focused discussions in person. Replicating this through online/calls requires an even more precise focus with clear objectives for the call to guide discussions.