DISASTER RISK ASSESSMENT

BY Prof Johanes A. Belle

Associate Professor

UFS-DiMTEC

Tel: 051 401 9347

Email: Belleja@ufs.ac

May 11, 2022

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

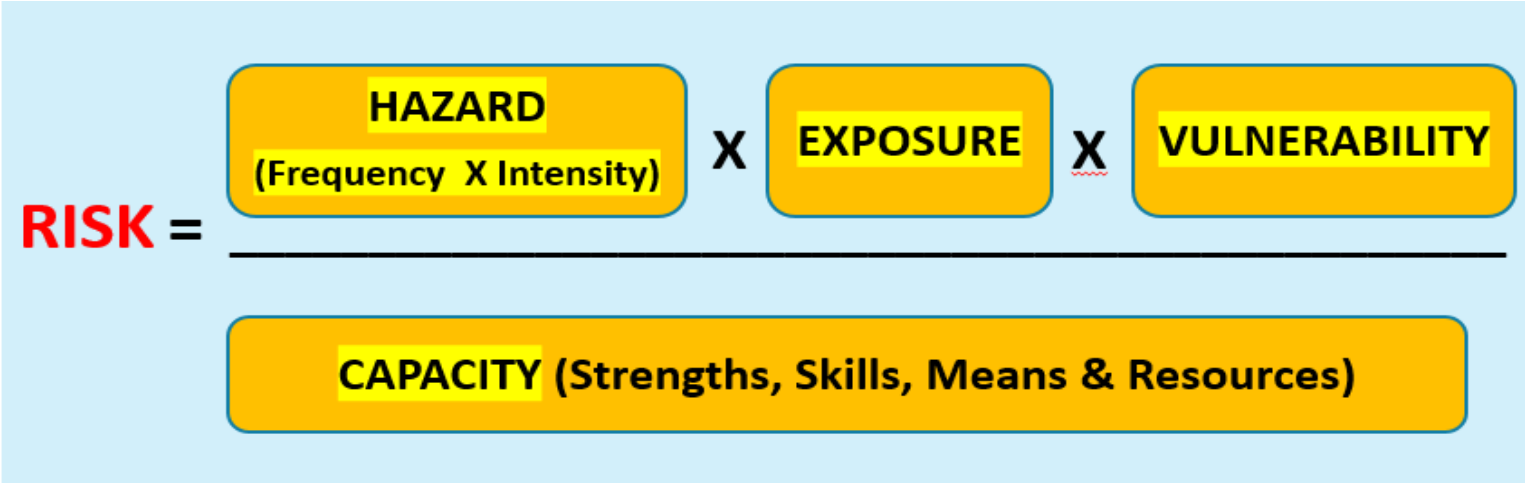
TABLE OF CONTENTS

T: 051 401 9111 info@ufs.ac.za **www.ufs.ac.za**

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA
UFS
UV

UNDERSTANDING DISASTER RISK

- **Risk is the Probability of hazardous event and its negative consequences. Product of hazard, exposure, vulnerability and capacity**



T: 051 401 9111 info@ufs.ac.za **www.ufs.ac.za**

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA
UFS
UV

RISK PERCEPTION

- Knowledge of the risk
- Experience with the risk
- How vicarious the risk is

It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.

ACCEPTABLE RISK

The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions; e.g what level of lockdown for COVID-19 to enable sustainable economic activities

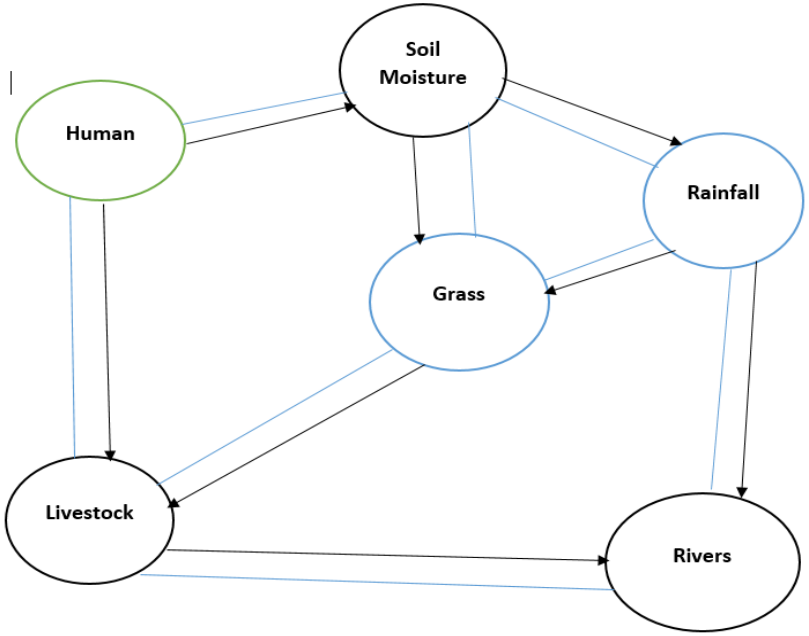
RESIDUAL RISK

The risk that remains after effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.

Systemic Risk

Interaction between CC and natural hazards with complex, interdependent and interconnected networks of social, technological, environmental and economic systems.

Assessing risk as a complex system where behavior in the network determine exposure and vulnerability at all scales (Example desertification)



Overstocking
Poverty/culture
Soil erosion
Infiltration
Runoff
Ground flow
Evapotranspiration
Water supply
Food security
Management/politics etc

- DISASTER RISK ASSESSMENT

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend (UNISDR, 2009).

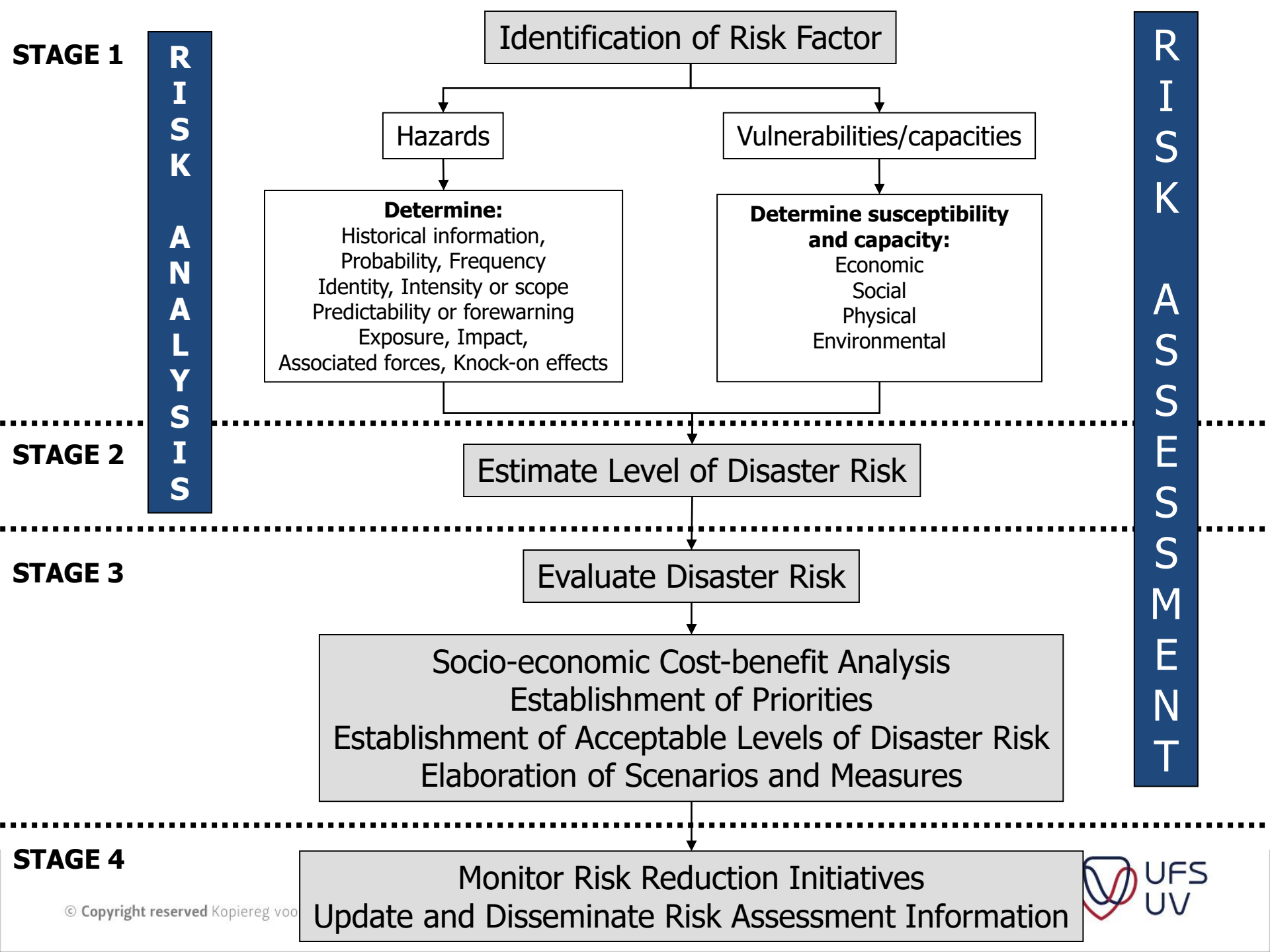
Risk assessment approaches depends on the decision-making context and the scale of assessment from global and national quantitative assessments to local-scale qualitative participatory approaches. Both complement each other in order to capture complex tangible and intangible aspects of vulnerability.

T: 051 401 9111 info@ufs.ac.za **www.ufs.ac.za**

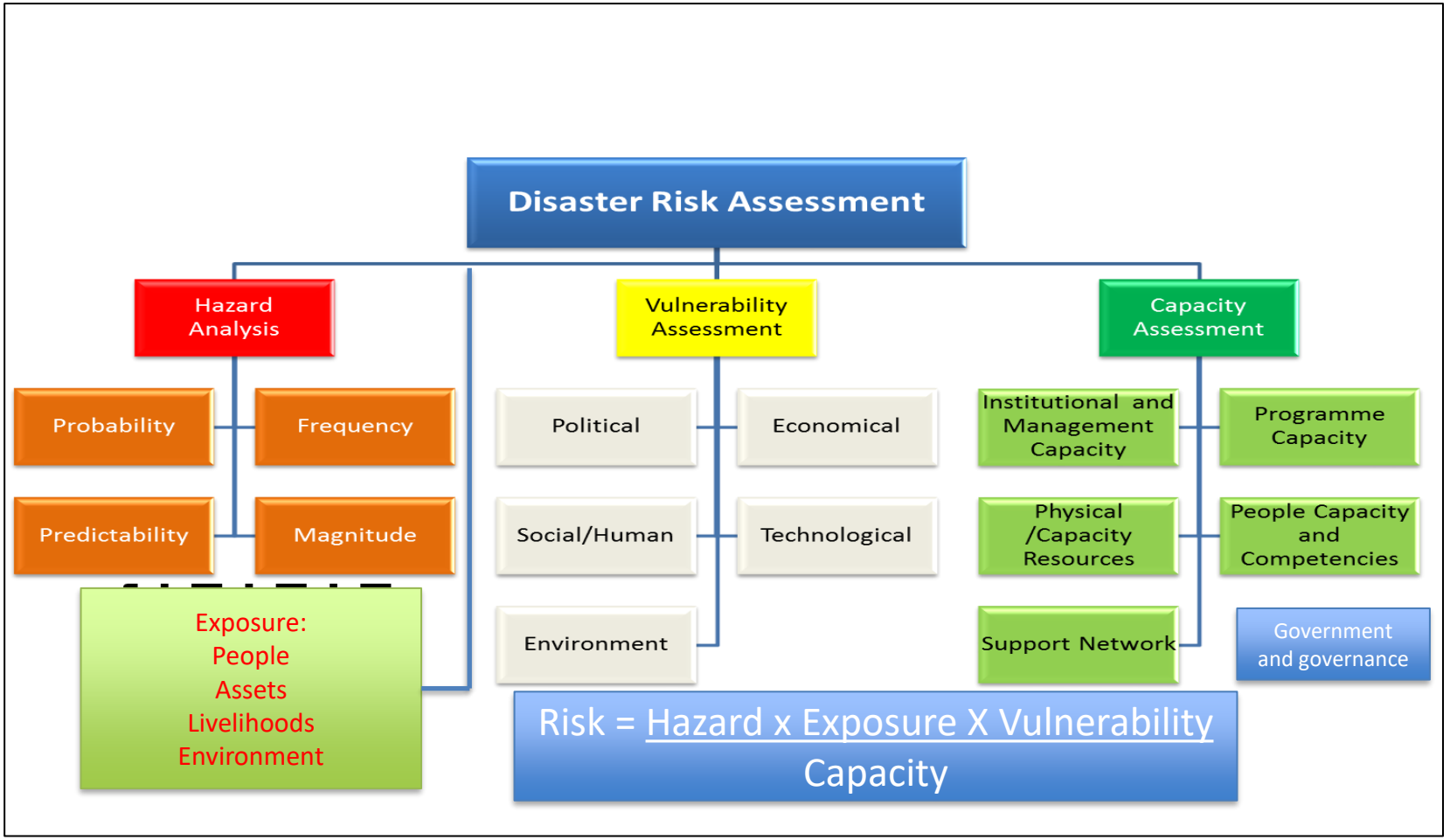
UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA
UFS
UV

SELECTED FRAMEWORKS FOR DRA

- UNISDR 2004- Living with Risk
- Sustainable Livelihood Framework (DFID 1999)
- MOVE (Method for the Improvement of Vulnerability Assessment in Europe)
- CoBRA (Community-based Resilience Analysis)
- TANGO (Technical Assistance to Non-Governmental Organizations)
- National Disaster Risk Assessment (UNISDR, 2017)
- Community Capital Framework (Flora & Flora 2006)



GRAPHIC SUMMARY OF DISASTER RISK ASSESSMENT UNISDR, 2004



UFS UV

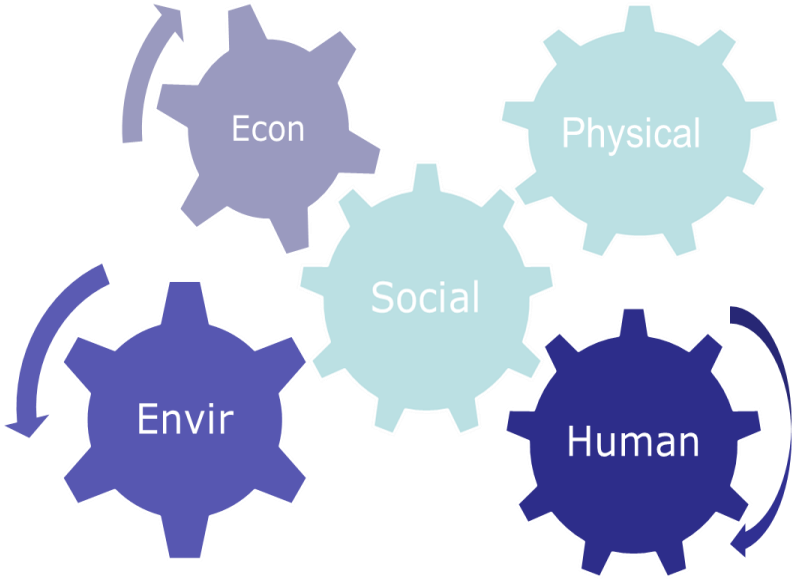
Hazard Analysis

- Type
- Probability
- Frequency
- Intensity
- Severity
- Magnitude
- Predictability

UFS UV

ECONOMIC VULNERABILITY

- Livelihood income
- Alternative income sources
- Employment security
- Land ownership
- Land size
- Debt ratio
- Product price sensitivity
- Capacity to work
- Physical assets
- Production and market opportunities



UFS UV

SOCIAL VULNERABILITY INDICATORS

- Initial well-being
  - Nutritional status
  - Physical health
  - Mental health
  - Human capital
  - Security and stress levels
- Education levels
- Gender
- Household size
- Civil society and social networks
  - Networks and organizations
  - Rights of organizations to operate
  - Degree of community participation
  - Equity of access to resources
  - Dissemination of knowledge
  - Press freedom
  - Type and level of engagement with population

UFS UV

ENVIRONMENTAL VULNERABILITY

- Land degradation
- Deforestation
- Erosion
- Vegetation type
- Slope
- Soil fertility
- Pollution levels
- Siltation levels
- Land use and land cover changes

✓ Environmental vulnerability index (SOPAC, 2004)

UFS UV

EXPOSURE ANALYSIS

- Human
- Livelihoods
- Assets
- Natural environment
- Critical infrastructure

COPING CAPACITY/ADAPTIVE CAPACITY (NOTE DIFFERENCE)

- Social protection
  - Preventative actions
  - Preparedness activities
  - Early warning
  - Regulations and policies
  - Political support and will
- Self protection
  - Access to information
  - Own reserves
  - Insurance
  - Technological advancement
  - Experience/motivation/knowledge

UFS UV

RISK PROFILING, MATRIX AND MAPPING

- Risk Matrix
- Risk profiling
- Risk Mapping
- Risk reduction measures
- Cost-benefit analysis

Risk Matrix	Impact				
Probability	Very low	low	moderate	High	Extreme
Very Likely					Fire
Likely				Drought	
Somewhat likely				Flood	
Unlikely					

Risk RATING

5 = Extreme
4 = High
3 =Moderate
2 = Low
1= Very Low

Risk Rating	Colours
Extreme (5)	
High (4)	
Moderate (3)	
Low (2)	
Very low (1)	

UFS UV

Hypothetical Hazard Analysis

Hazard	Probability	Frequency	Intensity	Sensitivity	Magnitude	Total	Average
Flood	2	2	2	1	2	9	1.8
Veld fire	3	3	3	3	3	15	3
Drought	3	3	3	2	3	14	2.8

Hypothetical Exposure Analysis

Hazard	Human	Livelihood	Assets	Critical infrastructure	Businesses	Environment	Total divided by 5
Flood	2	1	2	3	2	1	2.2
Fire	3	1	2	3	2	2	2.6
Drought	2	1	2	3	2	1	2.2

Hypothetical Vulnerability Analysis

Hazard	Physical	Economic	Environmental	Social	Legal and institutional	Total	Average
Flood	2	1	1	1	3	8	1.6
Fire	3	3	2	3	3	14	2.8
Drought	3	2	2	2	3	12	2.4

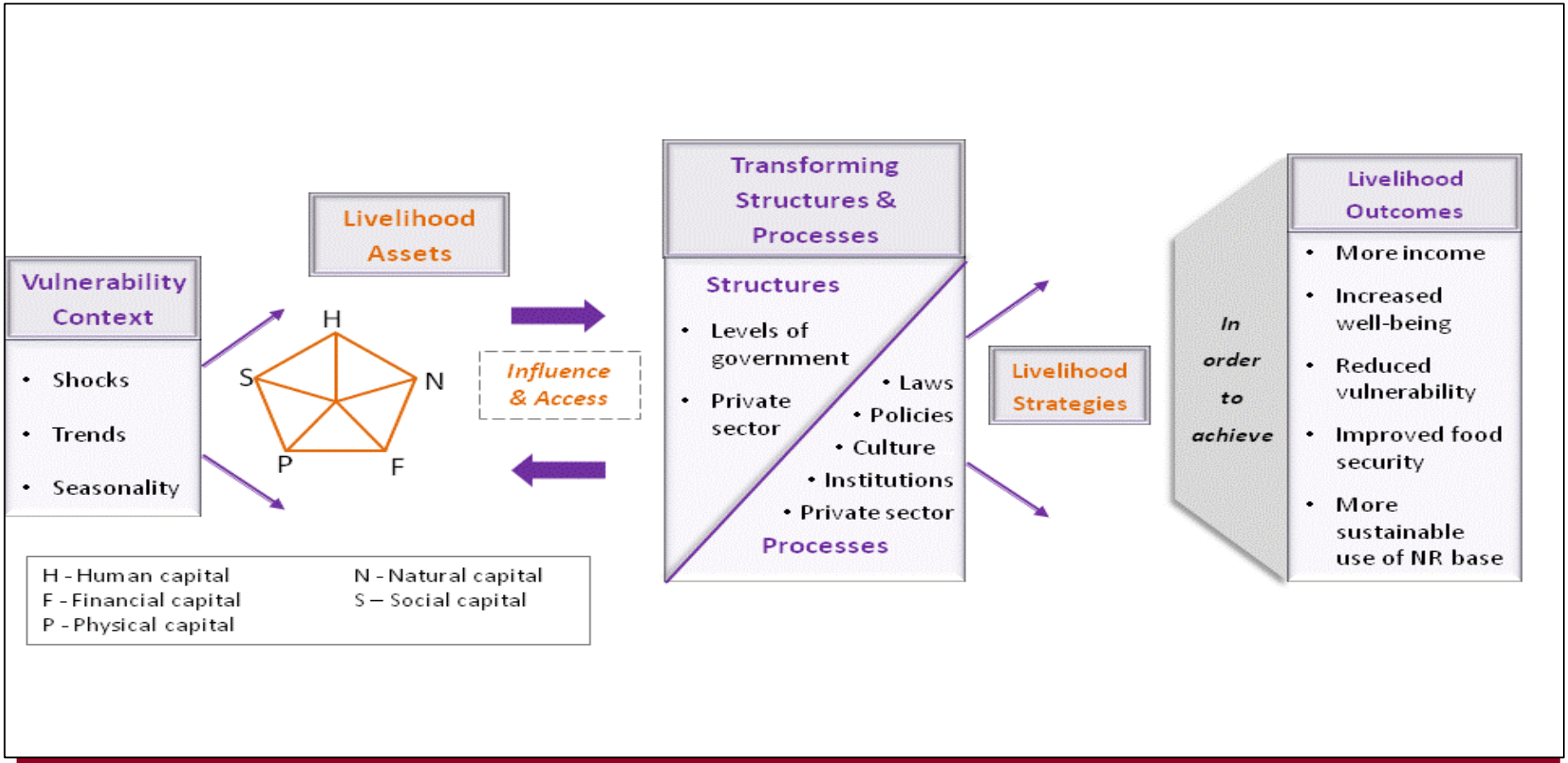
Hypothetical Capacity Analysis

Hazard	Public awareness	Legislation on DRR	Early warning systems	Respond activities	Prepared-ness plans	Manage-ment plan	Total divided by 5
Flood	3	2	3	3	2	2	3
Fire	3	3	2	3	2	2	3
Drought	2	3	2	3	2	2	1.8

HYPOTHETICAL RISK ASSESSMENT

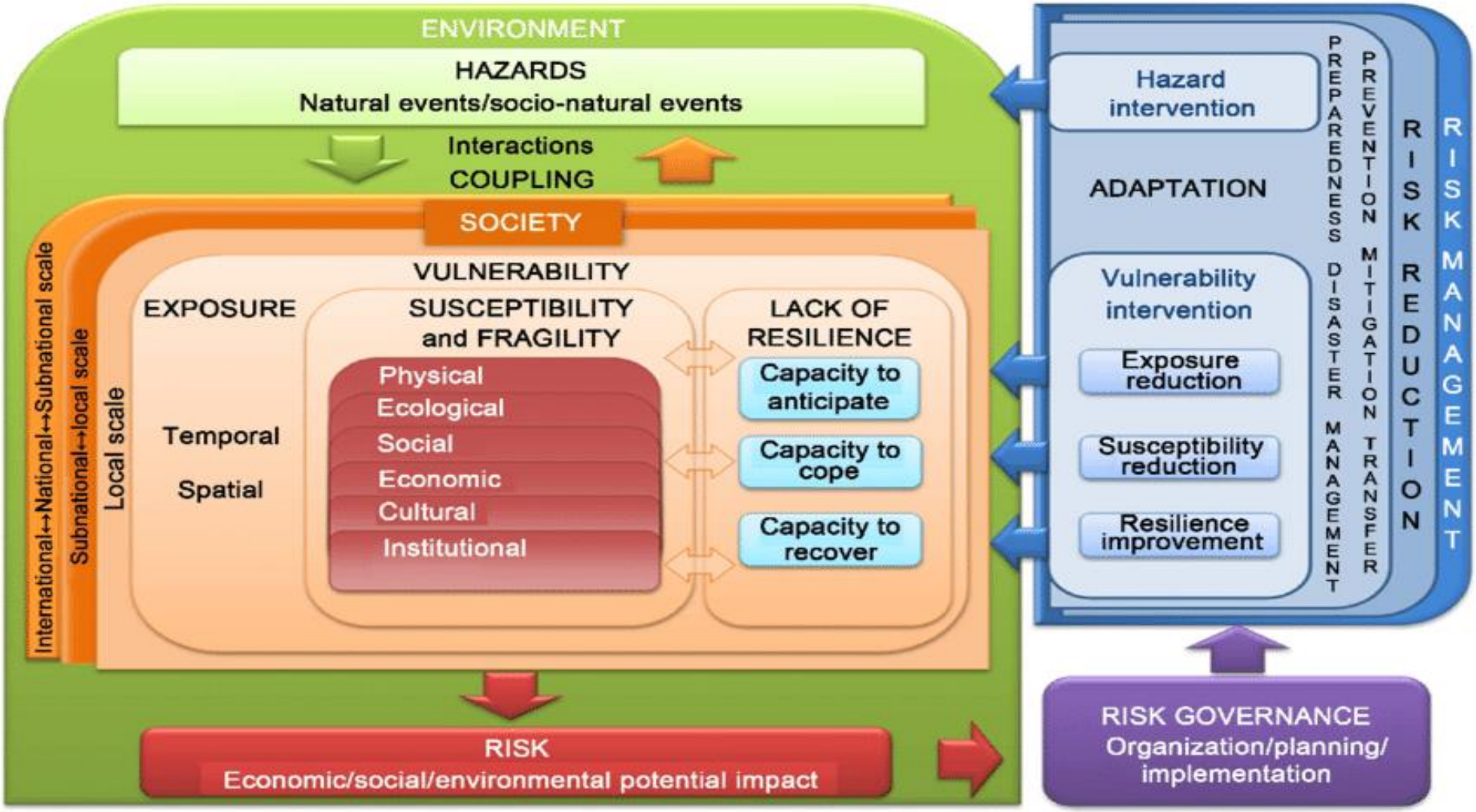
	Hazard Analysis	Exposure analysis	Vulnerability analysis	Capacity Analysis	Risk Assessment (R = H x E x V/C)
Flood	1.8	2.2	1.6	2.2	1.8 x 2.2 x 1.6/2.2 = 2.88
Fire	3	2.6	2.8	2.6	3 x 2.6 x 2.8/2.6 = 9.92
Drought	2.8	2.2	2.4	2.2	2.8 x 2.2 x 2.4/2.2 = 6.72

THE SUSTAINABLE LIVELIHOOD FRAMEWORK (DFID, 1999)



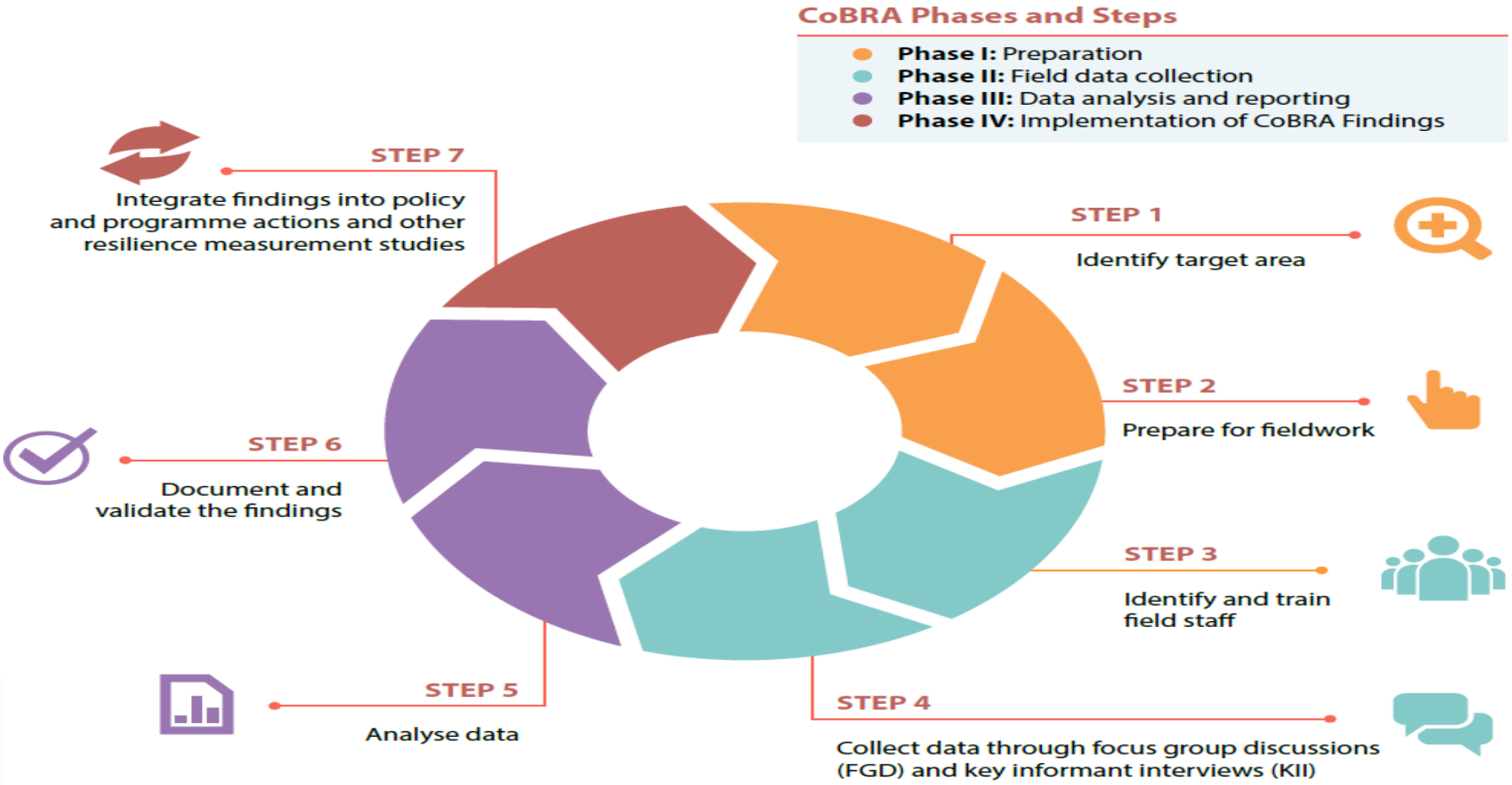
UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

- **The Method for the Improvement of Vulnerability Assessment in Europe (MOVE) FRAMEWORK**



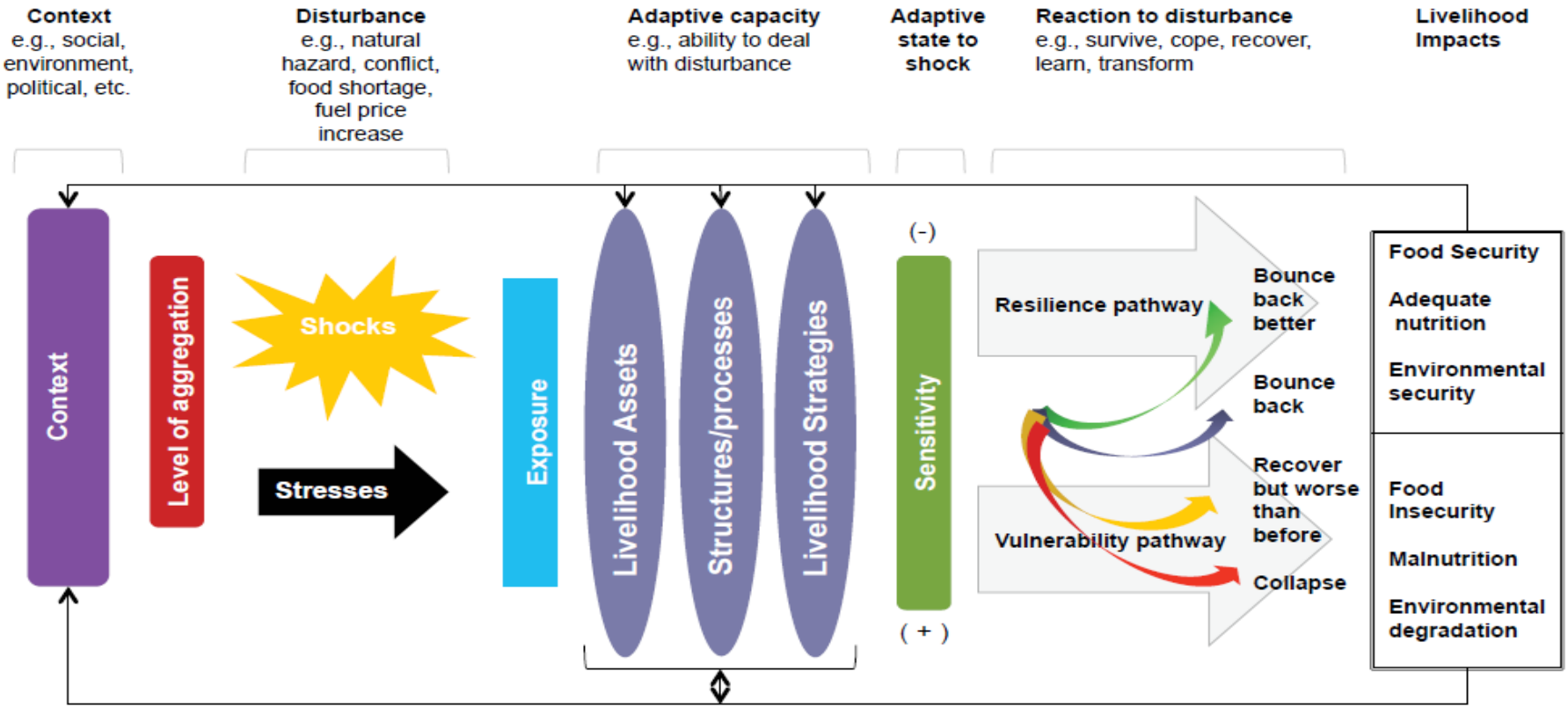
UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

COMMUNITY-BASED RESILIENCE ANALYSIS COBRA UNDP, 2017



UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

TECHNICAL ASSISTANCE TO NON-GOVERNMENTAL ORGANIZATIONS (TANGO) DFID, 2007

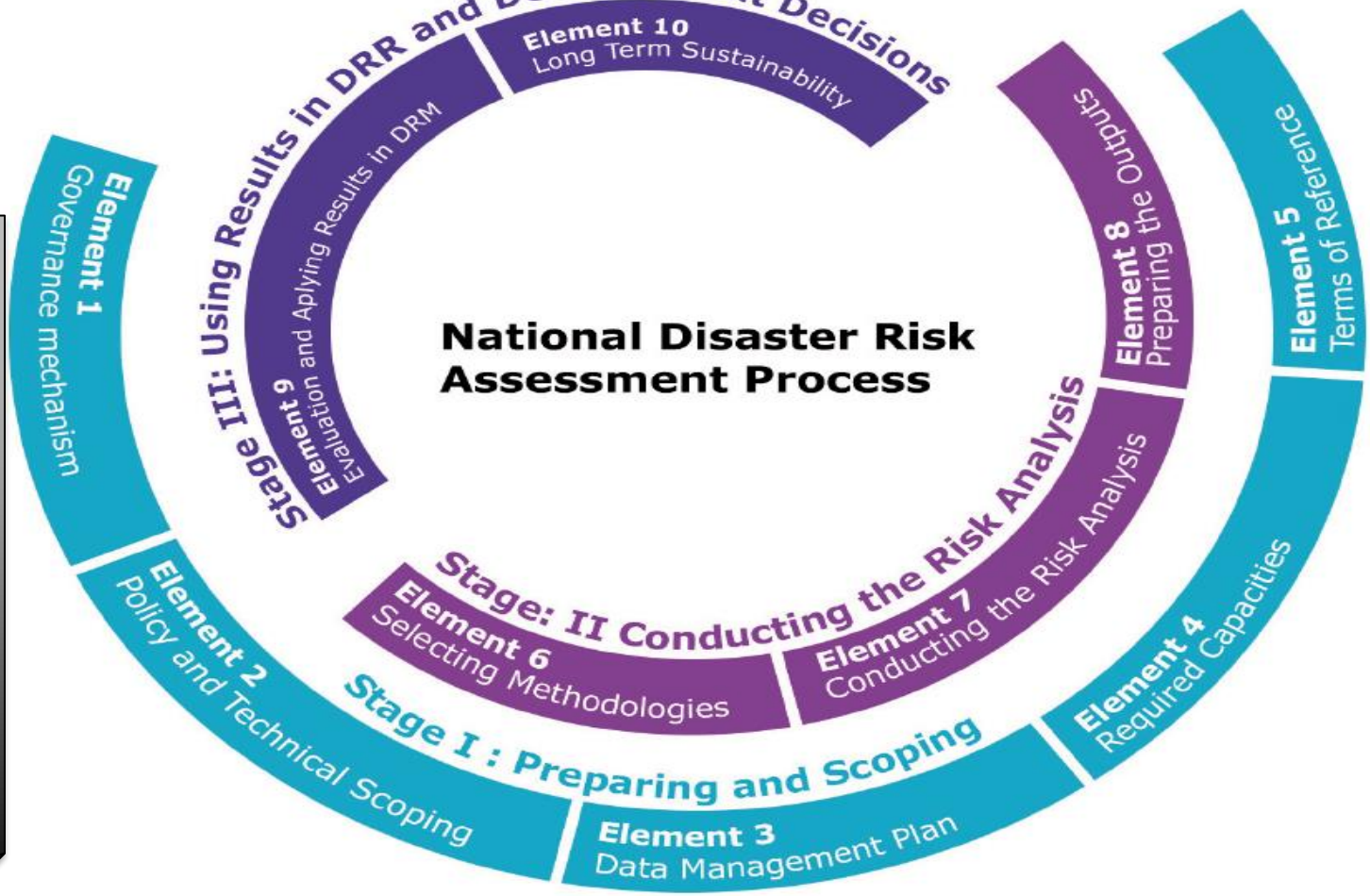


TANGO 2012. Adapted from DFID Disaster Resilience Framework (2011) , TANGO Livelihoods Framework (2007), DFID Sustainable Livelihoods Framework (1999) and CARE Household Livelihood Security Framework (2002)

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

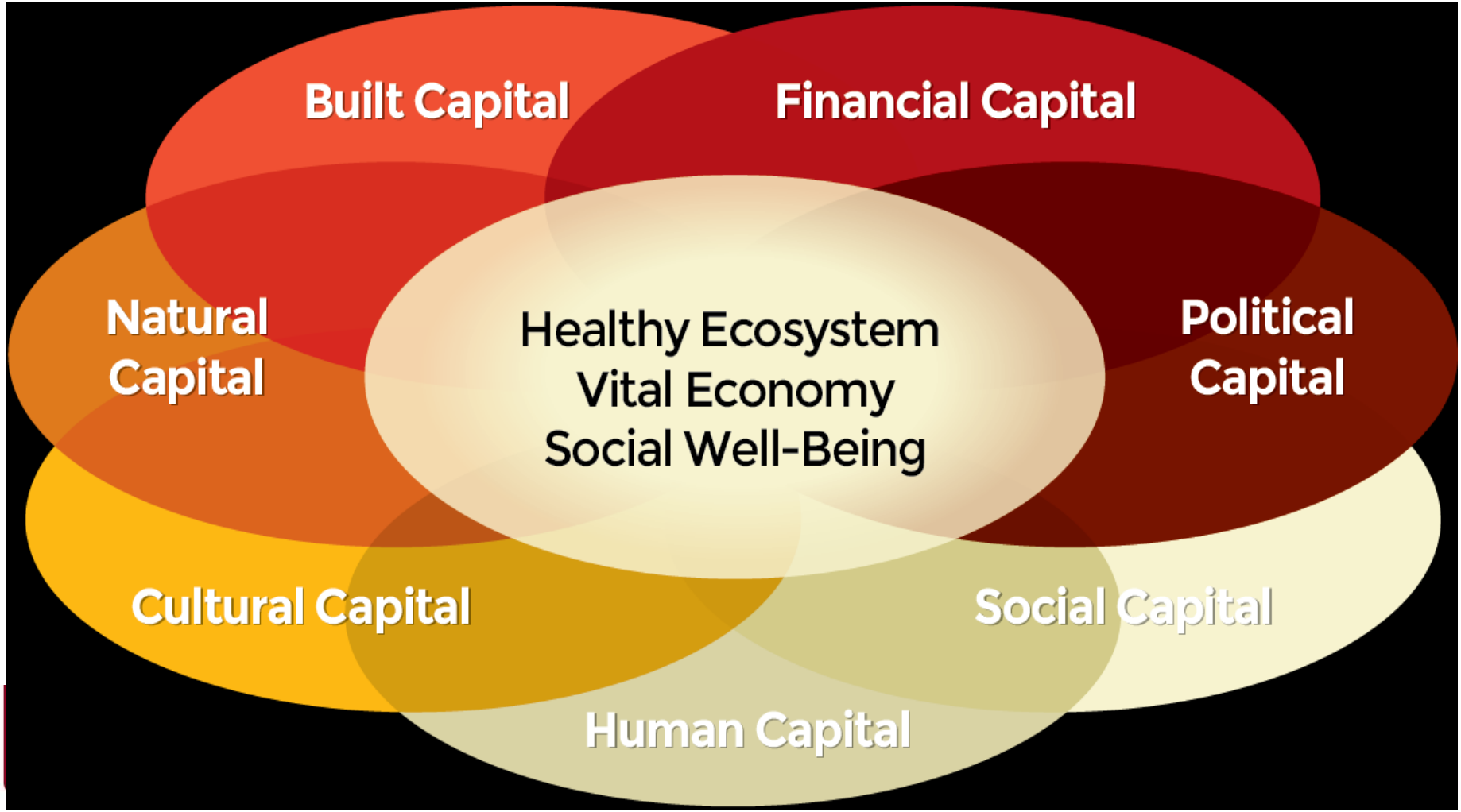
NATIONAL DISASTER RISK ASSESSMENT-UNISDR, 2017

Words into Action in Support of Sendai Framework: three stages with 10 Elements



UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

THE COMMUNITY CAPITAL FRAMEWORK (FLORA & FLORA 2006



UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

Capital	Description
Human	The combination of abilities, skills, good health, experience that empower people to adopt certain livelihood strategies
Social	Social resources that people depend on to achieve certain livelihood outcomes; such as social networks and relationships of trust
Financial	Monetary resources that make it possible to pursue certain livelihood strategies; such as income, savings, stocks, access to credit, livestock
Physical or Built	Basic infrastructure which is essential to sustainable livelihoods; such as housing, transport, basic sanitation, communication, water
Natural	Natural resources upon which some activities are based; such as water resources, land, wetlands, forests, air quality
Political	Ability of a community to influence standards, rules, regulations and their enforcement. Access to power and holding government accountable. Good governance and strong institutions
Cultural	Norms and behaviours, positive attitude example toward work, friendliness, ethnic festivals, multi-lingual populations, a strong work ethic.

Hazard	Capital	Weight	Indicator	Weight/ indicator	Index rating/ indicator					Total score/ driver	Total score /capital
Flood Or Multi Ha4zard					**1**	**2**	**3**	**4**	**5**	2	
	Human	0.2	Health	0..4					5	0.8	**Total score X weight (4.28 x 0.2)** **0.856**
			Skills	0.2				4			
			Household size	0.01	1					0.01	
			Age	0.09			3			0.27	
			Education	0.3				4		1.2	
					Total					**4.28**	
	Economic	0.18	Sources of income	0.8					5	4	**0.792**
			Employment	0.1		2				0.2	
			Savings	0.1		2				0.2	
					Total					**4.4**	
	Social	0.12	Social network	0.9				4		3.6	**0.456**
			safety	0.1		2				0.2	
					Total					**3.8**	
	Built/Physical	0.2	Roads	0.4			3			1.2	**0.8**
			Communication	0.2			3			0.6	
			Hospitals	0.2			3			0.6	
			Water	0.4				4		1.6	
					Total					**4**	
	Natural	0.2	Biodiversity	0.8				4		3.2	**0.72**
			soil	0.2		2				0.4	
					Total					3.6	
	Political	0.1	Government & Governance	0.3	1					0.3	**0.38**
			Policies & Institution	0.7					5	3.5	
	4.004				**Total**					**3.8**	

Thank You!
Bai Dankie!
Merci!

T: +27(0)51 401 9111 | info@ufs.ac.za | www.ufs.ac.za

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

UFS
UV