



Engineering Peace and Security Interventions: *A Case Study in Somalia*

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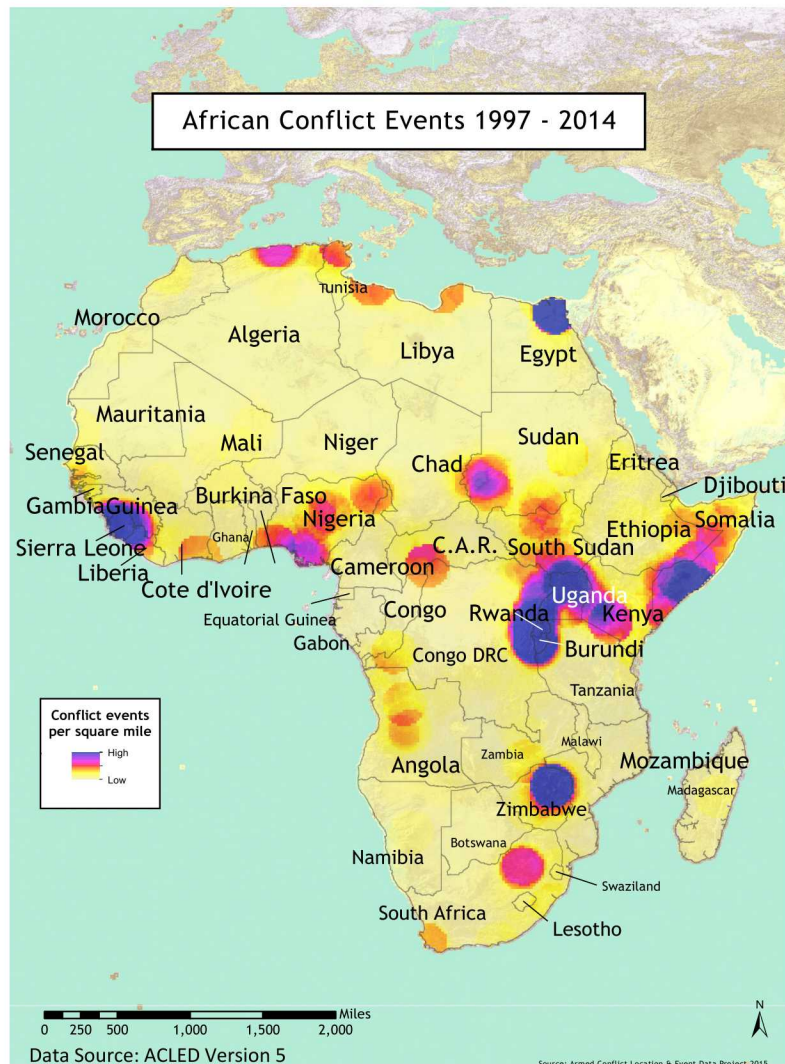
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The Problem:

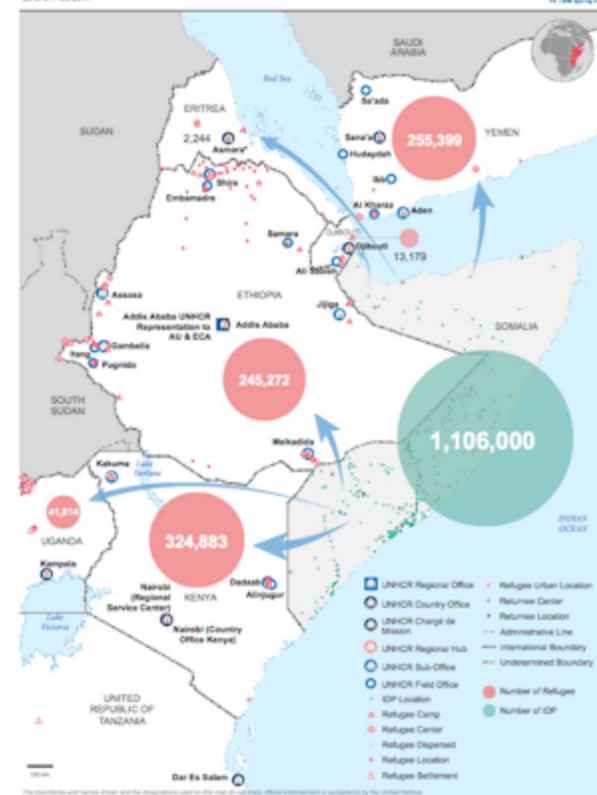
Persistent Conflict & Human Insecurity



Somalia Situation

Regional overview

as of 01 Feb 2017

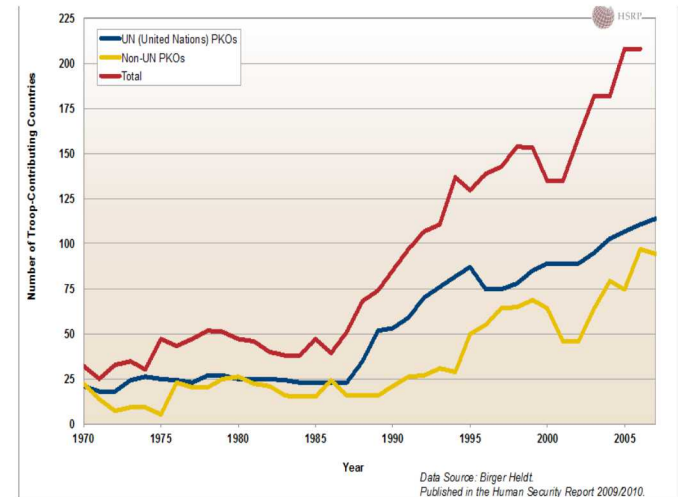
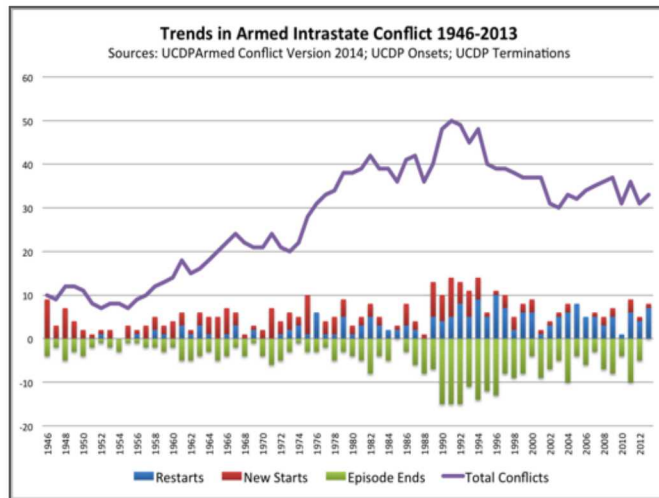


Interventions in Persistent Conflicts:

A poor scorecard

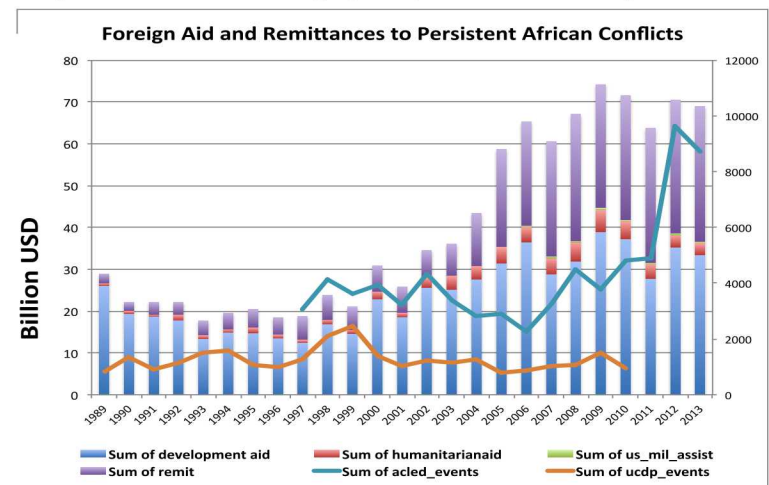
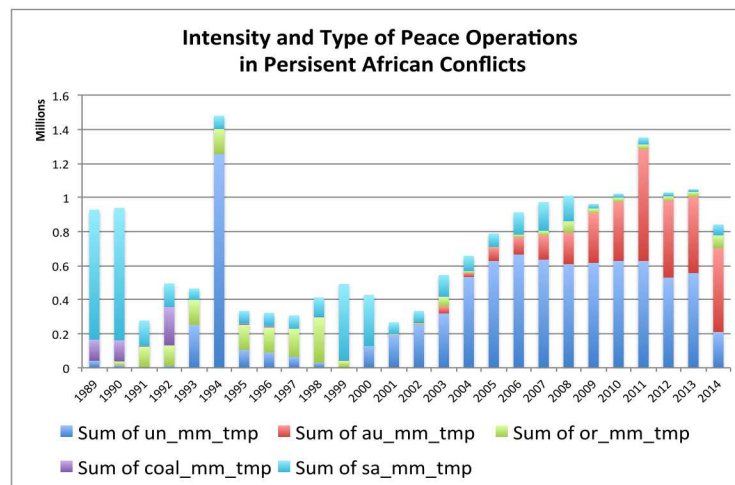


Conflict restarts in Africa rise despite 100,000 peacekeepers from over 100 countries



... and over \$ 1 trillion aid and peacebuilding (Hayden, 2016)

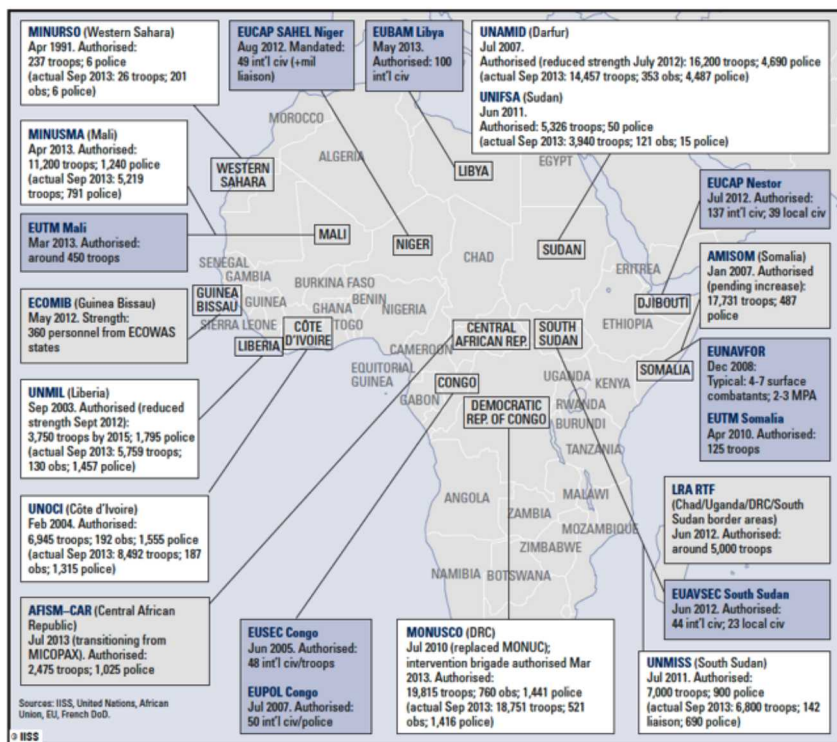
Mission Months X Total Military Personnel (millions)



Snapshot 2014 - 2016: Complex Mix of Actors



Peacekeeping Missions (2014)



Map 8 Africa: Selected Peacekeeping and Security Missions

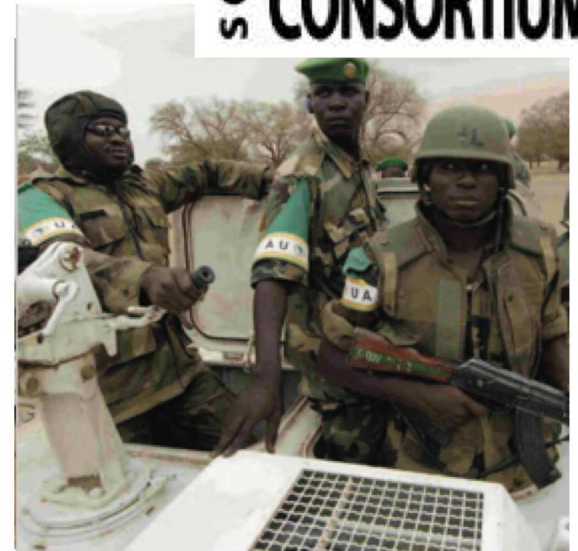
Source: Military Balance Report, 2014

Humanitarian Assistance (2016)



Key Questions

1. Are intervention failures due to ***intractability of the conflicts, unsuitable intervention policies, insufficient resources***, or some combination of all?
2. What ***are key levers*** that might ***change*** the responses to interventions, reduce risk of failures and improve security?
3. How might ***engineering enable these levers***?

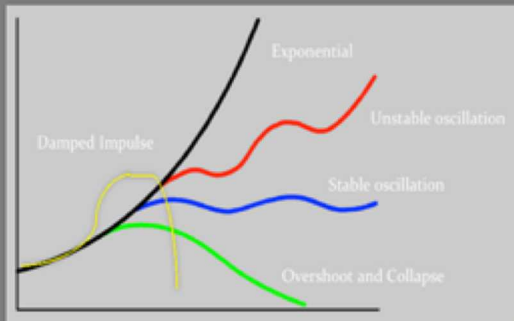




Dynamics of Conflict Violence:

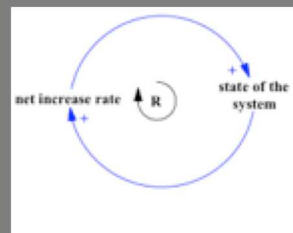
System feedback structures explain reference behaviors

Patterns of conflict violence in Africa display archetypal reference behaviors

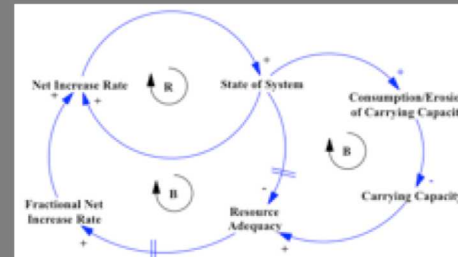


Quantitative Regression Analysis (Macro -Level)

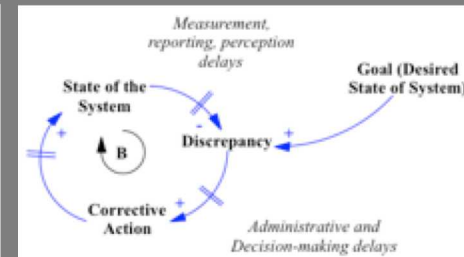
- Are dominant feedback structures of reference behaviors correlated with theoretical conflict risk factors?
- Do correlations map to system structures observed across persistent conflicts?



Exponential



Overshoot & Collapse

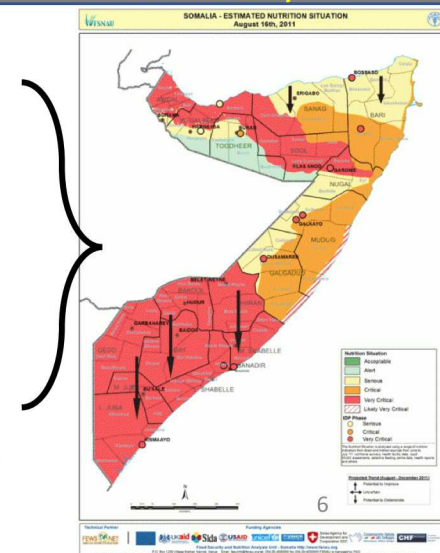


Oscillatory

Case Study and Causal Mechanisms – Micro-Level

- Do correlations map to system structures that explain resiliency of different actors *in Somalia*?
- How do interventions in Somalia interact to affect conflict and human security at local levels?

What are the implications for peace engineering?

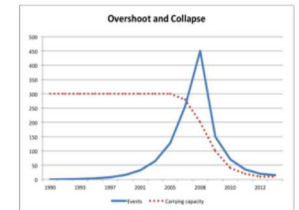




Comparative Regression Analysis of Reference Behaviors and Risk Factors: 34 Conflicts in 30 African Countries 1989 – 2014

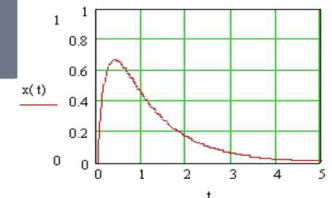
Overshoot and Collapse

- *Chad, Burundi, Liberia, Namibia, Rwanda, South Africa*



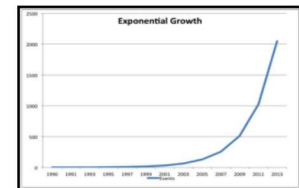
Damped Impulse

- *Angola-UNITA, Congo, Guinea, Guinea-Bissau, Lesotho, Sierra Leone*



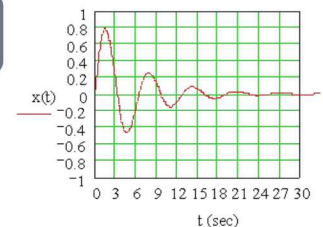
Exponential Growth

- *Burkina Faso, Cameroon, DRC, Gabon, Mauritania, Mozambique, Nigeria- BH, Somalia, Sudan*



Oscillations about a Mean

- *Algeria, CAR-Seleka, CAR-political, Ivory Coast, Ethiopia-ONLF, Ethiopia-political, Kenya-Turk, Kenya-Kikuyu, Niger, Nigeria- political, Senegal, Uganda, Zimbabwe*



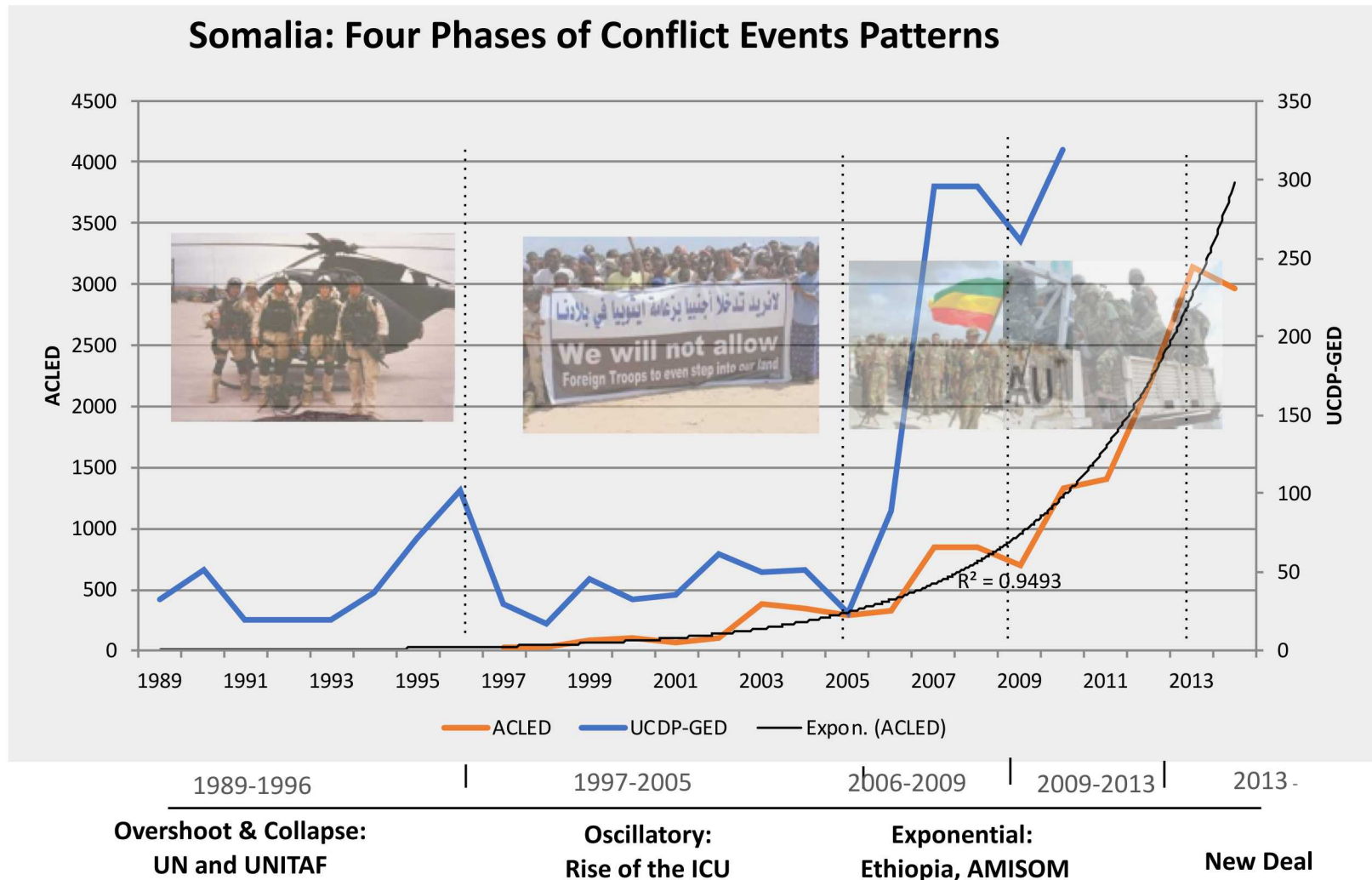
Conflict behaviors correlated with risk factors to suggest causal mechanisms

- Ratio of *amplifying capacities* and *balancing relationships* is significant
- Interventions are secondary influence compared to state characteristics and **endogenous conflict balancing mechanisms**
- Mechanisms are a mix of **micro and macro phenomenon**

Regression Analysis Results

Study Results (Regression Analysis)			
Reference Behavior	Strongest influence	Resilience	Little to no influence or inconsistent results
Overshoot and Collapse	small population highest gender equality high state capacity/reach lower infant mortality highest % humanitarian aid UN peace operations	Low combatants High noncombatants Transformative outcomes support peace	GDP growth; coalition or single actor troop mission months; peace agreements or negotiated settlements; aid % GDP; CPIA
Damped Impulse	high state capacity/reach higher infant mortality gender equality natural resources ethnic polarization high military expenditures to aid	State: high Challenger : low Risk: Vulnerable outcomes	
Exponential	lowest state capacity/reach high % humanitarian aid lowest military expenditures to aid lowest polity high social fragmentation	High combatants Low noncombatants Risk: Transformative outcomes support high intensity conflict	
Oscillatory	highest population, infant mortality high capacity/low state reach lowest gender equality highest poverty, low cover lowest % humanitarian aid	Moderate combatants Low noncombatants Risk: Adaptive outcomes support low intensity conflict	

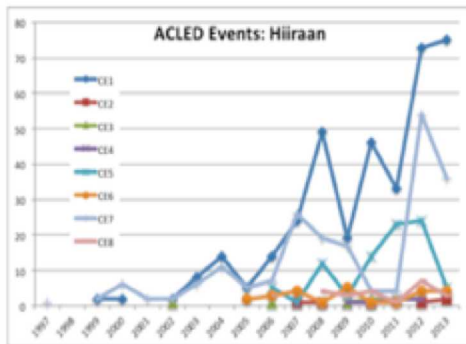
Intervention Phases and Conflict in Somalia



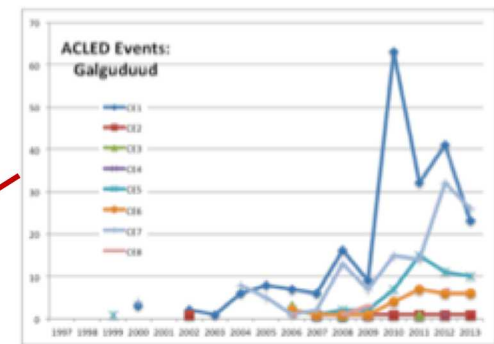
Conflict behavior patterns and correlations appear to scale to mesa and micro levels



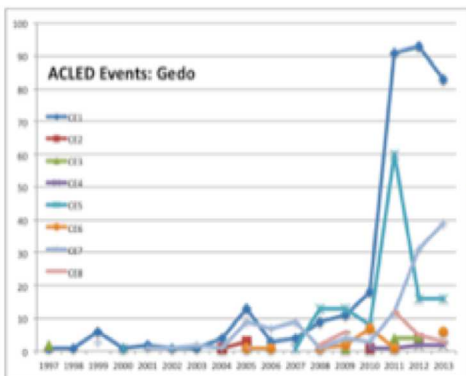
Somalia districts differentiated by key risk factors (state capacity, aid resources, security presence, social cohesion, governance)



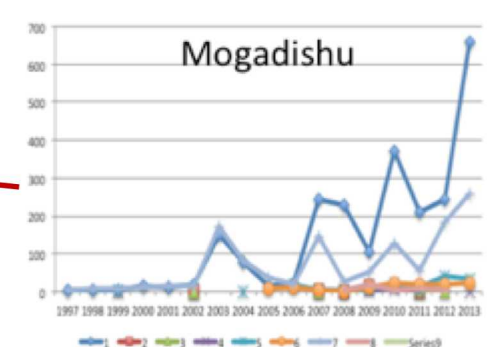
Oscillatory



Overshoot and collapse



Damped impulse

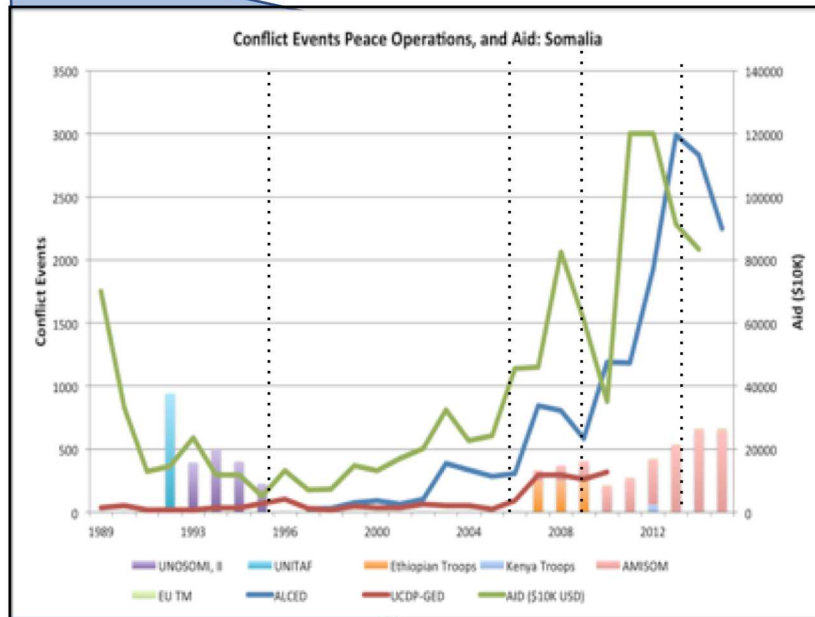


Exponential (oscillatory)



Peace operations and humanitarian aid interact at micro levels to reduce human security

Macro-level trends: lagged feedback



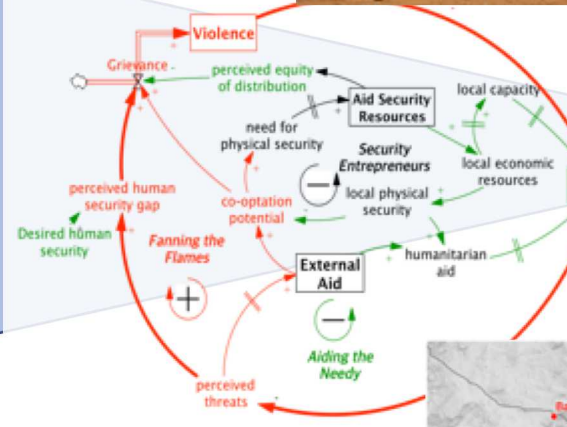
Aid Deserts



Photo: Oxfam



Photo: AMISOM



Security Entrepreneurs



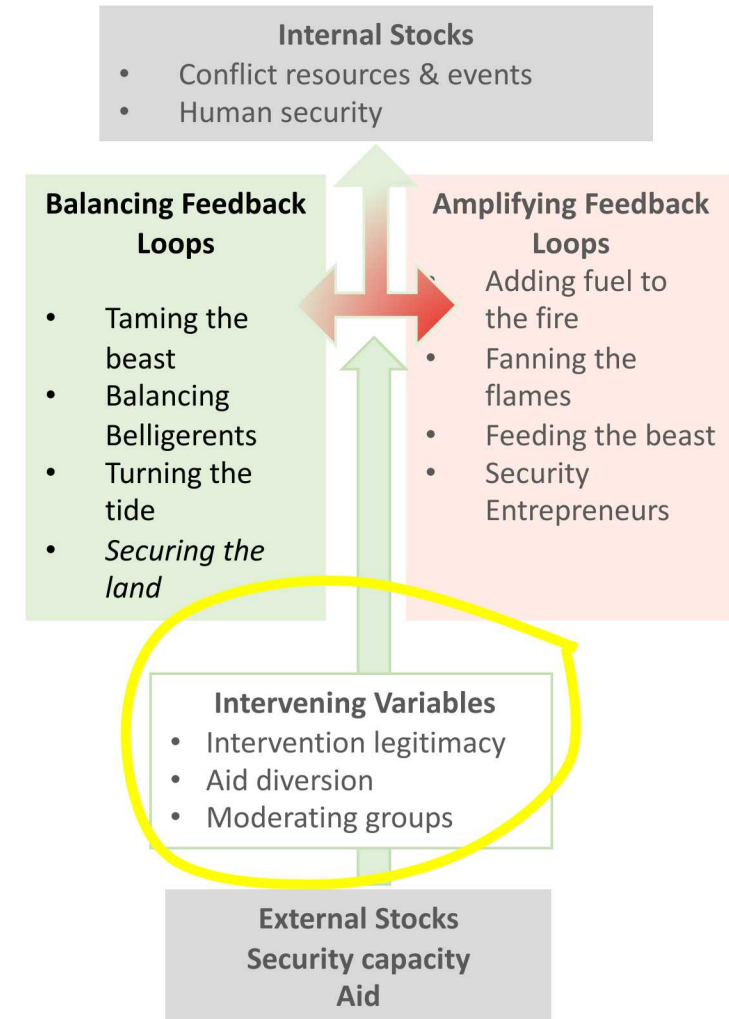
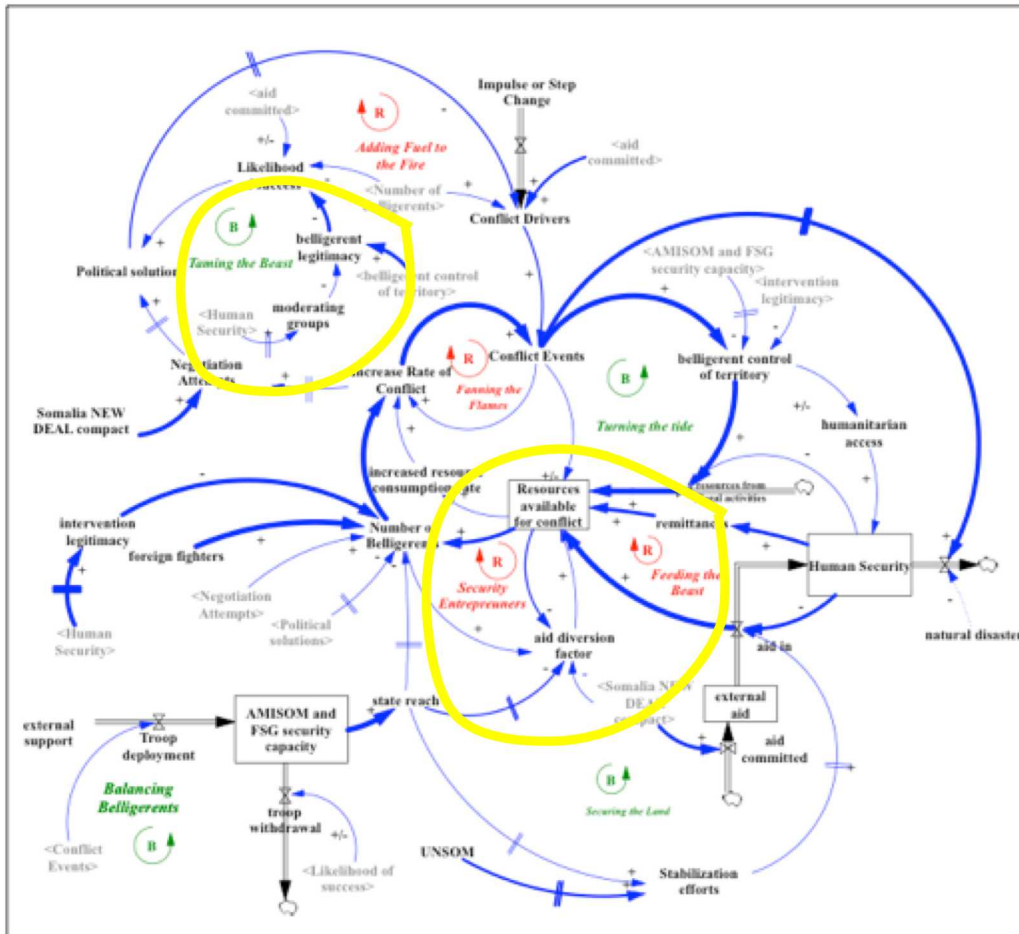
Micro-level processes explain macro trends:

- Dependent on perceived legitimacy of operations
- Lack of coordination, transparency create **Aid Deserts** and **Security Entrepreneurs**

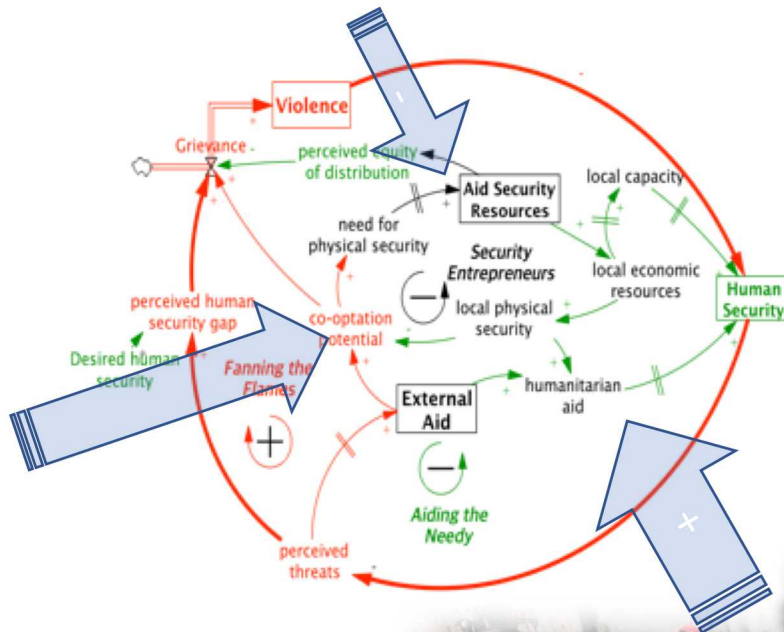


Complex Dynamics Depend on Intervening Variables at Local Level

Exponential Growth: Dynamics in Somalia Conflict 2013-2015



Proposal: Strengthen Intervening Variables that reduce co-optation potential



Reduce the power of security entrepreneurs,
war lords, and gatekeepers



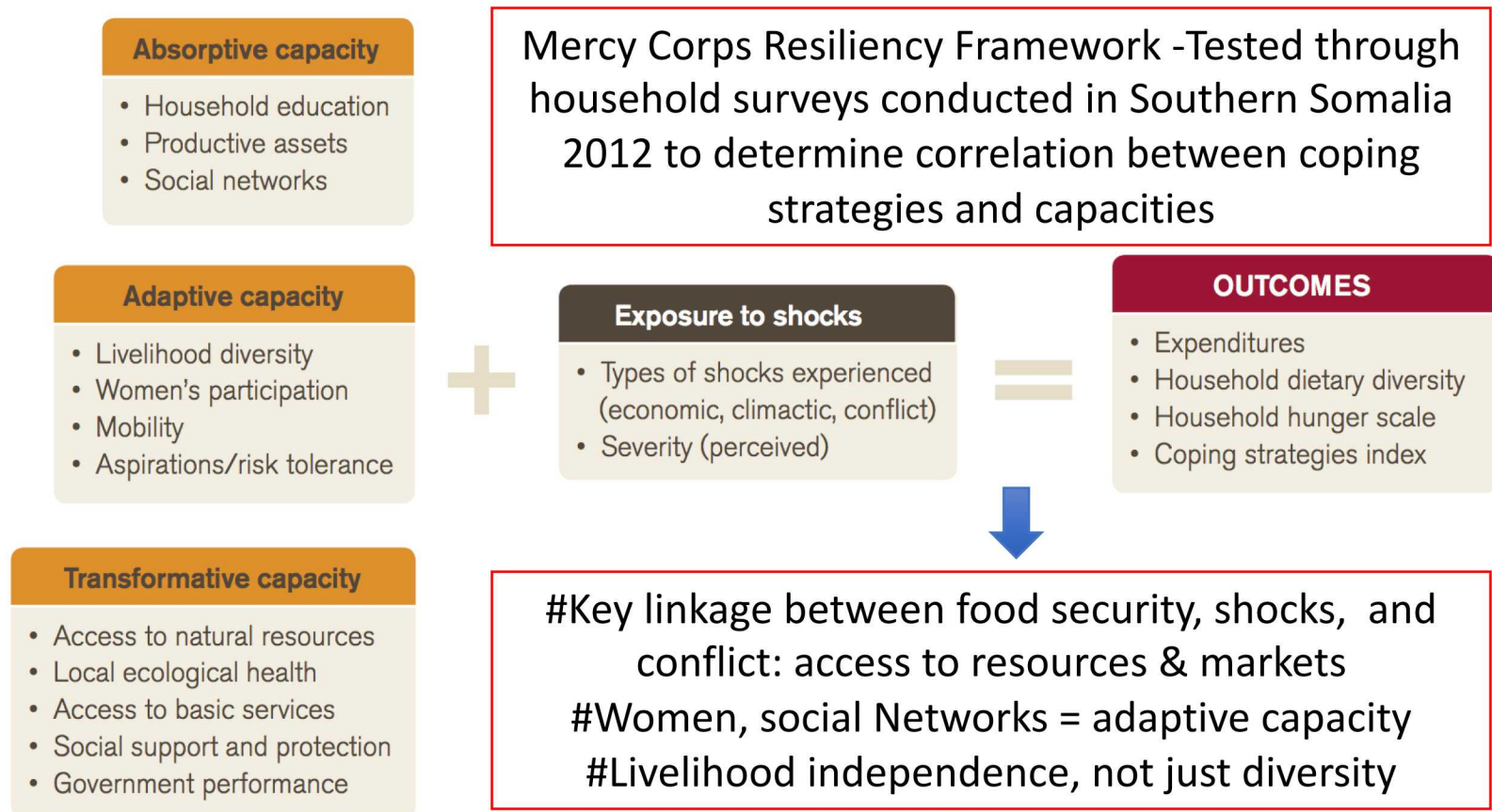
Empower local level
accountability and
transparency for aid delivery





NGO Research confirms importance of accountability at community and household level:

Mercy Corps¹, Interpeace², USAID³



¹What Really Matters for Resilience? Exploratory Evidence from Southern Somalia, Mercy Corps, October 2013

² The Search for Peace: Somali Programme Synthesis Report of the Peace Mapping Study, Interpeace, June 2009

³ Simmons, Emmy. (2013). *Harvesting Peace: Food Security, Conflict, and Cooperation*, Environmental Change & Security Program Report 14(3). Washington DC: Woodrow Wilson International Center for Scholars.

Engineering Transparency and Accountability for Aid Delivery in Conflict



Pilot Aid Projects:

- Development
- Disaster Response
- Cash transfers

Needed: Applications for Humanitarian Aid in Conflict

- Reduce reliance on “security entrepreneurs” and other gatekeepers
- Reduce exploitation of aid as source of power
- Track chain of custody and distribution
- Coordination among diverse aid providers at distribution

Challenges

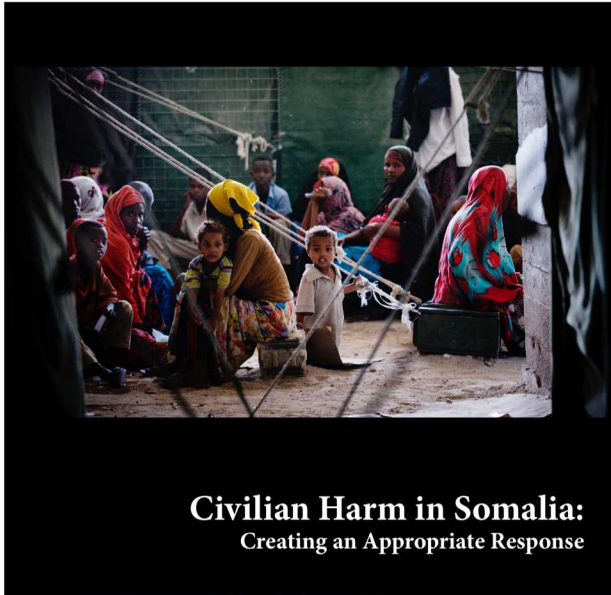
- Engineering system integrity, security and PII protection
- Cultural resistance, unintended consequences
- Coherence among requirements of aid program managers



Potential Solution: Blockchain Technology for Supply Chains that Promote Human Security

Research steps:

- State-of-the art in blockchain algorithms for secure contracts
- Requirements development through immersive world-building and simulation
- Design prototype and test in pilot





SUMMARY

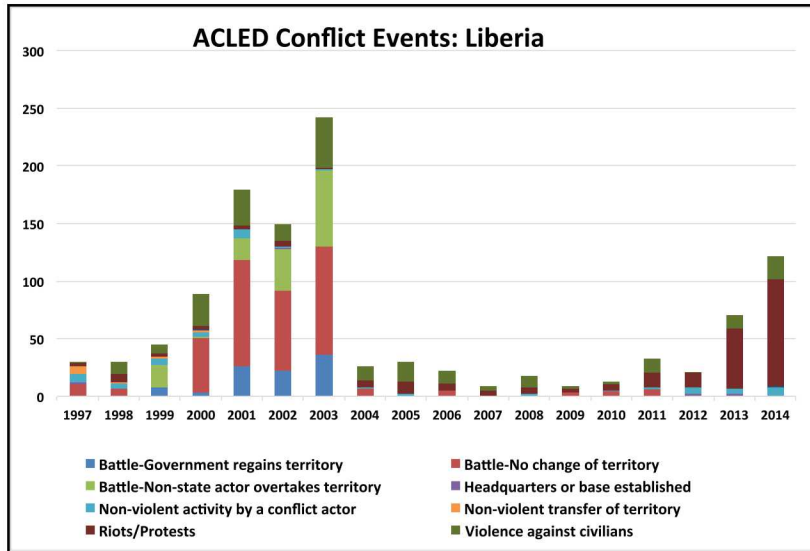
- Conflict dynamics exhibit reference behaviors explained aid and peacekeeping interactions at local level
- Key lever: inclusive local accountability
- Blockchain can fundamentally change intervention dynamics
- Challenges: trust, security and integrity



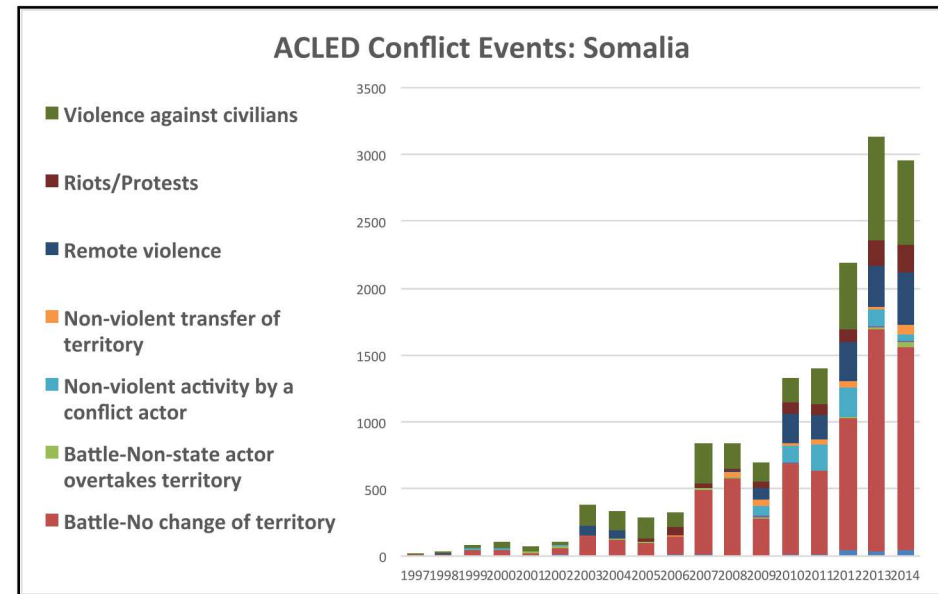
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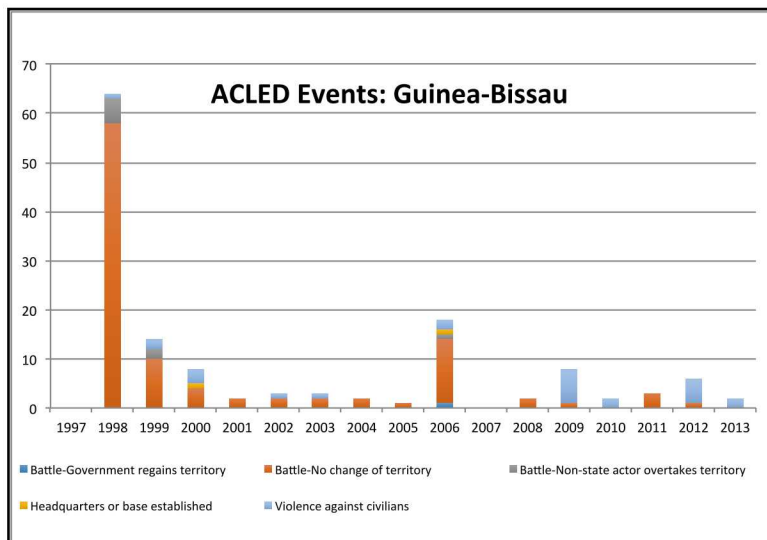
Exemplars of Behavior Types



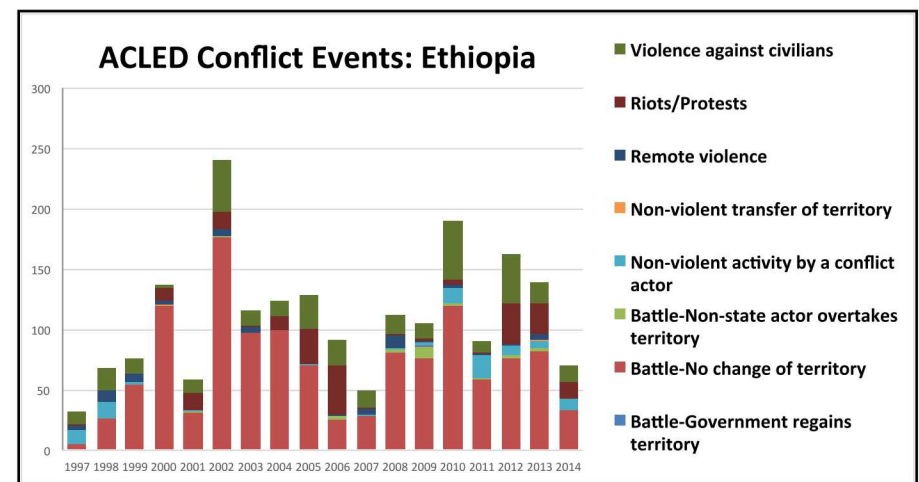
Overshoot & Collapse



Exponential



Damped Impulse



Oscillatory



Conflict Cases and Archetypal Reference Behaviors

Average Country Level Risk Factors for Conflict Persistence 1990 - 2014

Conflict Country ¹	SD Mode	State Capacity				State Reach			Poverty	Inequality
		Ave GDP per Capita	Ave Population ² (M)	Ave GDP Growth ²	% GDP Oil Exports ³	% Urban ²	% Electricity Access ²	Military Expenditures ⁴ (M) [% Gov Spending]	Annual GDP per capita 10% ² (2010)	GINI ²
Burundi	A	170	7.3	1.3	-5.6	8.6	3.1	50 [18.5]	53	36
Chad	A	475	8.9	6	33	22	1.97	216 [14.1]	108	44
Liberia	A	200	2.9	5.1	-0.8	48	1.59	7.7 [3.6]	79	36
Namibia	A	3087	1.9	4.2	-4.4	34	35.5	191 [9.7]	336	61.3
Rwanda	A	332	8.5	5.2	1.3	16	6.43	67 [13.3]	64	50
South Africa	A	4590	44.4	2.5	0.07	58	71.3	3380 [4.8]	467	62
<i>Average A</i>		<i>1475.7</i>	<i>12.3</i>	<i>4.1</i>	<i>3.9</i>	<i>31.1</i>	<i>20.0</i>	<i>650[10.7]</i>	<i>184.5</i>	<i>48.2</i>
Angola	B	1922	15.1	5.8	46	34	31.3	1670 [10]	361	49
Congo-Brazzaville	B	1581	3.3	3	54	50	27.5	156 [8.3]	308	51
Guinea	B	417	9.1	3.4	-2.6	32	16.8	78.2 [10.7]	93	42
Guinea-Bissau	B	350	1.3	2.5	-3.3	38	53.7	8.4 [9.7]	78	43
Lesotho	B	617	1.9	4.2	8.8	20	9.46	33 [6.8]	55	56
Mali	B	382	12	4.6	-5	30	15.1	78.2 [6.7]	105	42
Sierra Leone	B	308	4.7	2.6	-15.5	41	8.79	28.4 [8.2]	84	37
<i>Average B</i>		<i>796.7</i>	<i>6.8</i>	<i>3.7</i>	<i>11.8</i>	<i>35.0</i>	<i>23.2</i>	<i>293.2[8.6]</i>	<i>154.9</i>	<i>45.7</i>
Bukina Faso	C	379	12.5	5.5	-4.4	19.8	8.7	75.2 [8.2]	87.7	45
Cameroon	C	900	16.8	2.2	7.2	46.5	41.4	214 [7.9]	225	43
DRC	C	249	52.2	0.8	2.6	36	.	247 [8.7]	55	43
Gabon	C	6302	1.3	2.9	39	77	39.8	136 [6.1]	1701	42
Mauritania	C	670	2.9	3.6	-5.7	50	14.9	59.2 [.]	173	40
Mozambique	C	295	19.1	6.5	-7.2	29	9.51	79.3 [9.7]	57	45.7
Nigeria (BH)	C	850	129	5.8	33	37	44.9	817 [3]	161	46
Somalia	C	195	7.8	0.4	-1	34	25.8	307[3]*	.	.
Sudan	C	903	29.4	3.8	10.2	32	25.7	1070 [21]	234	35
<i>Average C</i>		<i>1193.7</i>	<i>30.1</i>	<i>3.5</i>	<i>8.2</i>	<i>40.1</i>	<i>26.3</i>	<i>333[8.5]</i>	<i>336.7</i>	<i>42.5</i>
Algeria	D	2713	24	2.8	19.7	50	97.1	3897 [10]	505	35.3
CAR	D	279	37	1.1	-7.1	38	6.15	20.3 [9]	49	53
Ethiopia	D	273	68.9	6	-5	15	15.2	478 [15]	95	33.6
Ivory Coast	D	952	16.1	2.1	2.5	45	48.9	244 [12.2]	218	41
Kenya (Kik)	D	576	32.7	3.5	-8.9	21	16.1	375 [6.8]	110	47
Niger	D	258	12.4	3.3	0.9	16.5	7.4	35.6 [5.7]	80	38
Nigeria (P)	D	850	129	5.8	33	37	44.9	817 [3]	161	46
Senegal	D	736	10.5	3.5	0.001	36	16.1	126 [6.1]	167	43
Uganda	D	332	25.9	6.8	-4.9	12.7	10	224 [12.5]	78	43
Zimbabwe	D	608	12.6	5.9	-3.4	33	33	220 [10.2]	.	42
<i>Average D</i>		<i>757.7</i>	<i>36.91</i>	<i>4.08</i>	<i>2.6801</i>	<i>30.42</i>	<i>29.485</i>	<i>643[9.1]</i>	<i>162.556</i>	<i>42.19</i>

¹Some countries have conflicts with different reference behaviors ²Data from World Bank ³Data from The Economist ⁴Data from SIPRI *Estimated