### Framing:

#### Even if there’s an objective morality, it can’t be transcendent like a scientific law—moral judgements depend upon lower-level laws that require exceptions

Lance and Little 6 Mark Norris Lance and Margaret Olivia Little. “Defending Moral Particularism.” In *Contemporary Debates in Moral Theory*, James Dreier (ed.), 2006. Z. Smith Reynolds Library at Wake Forest University. Mark Norris Lance is a professor in the Philosophy Department and Justice and Peace Studies Program at Georgetown University Margaret Olivia Little Director, Kennedy Institute of Ethics Associate Professor, Philosophy Department Georgetown University https://philpapers.org/rec/LANPAA-2 //avery

But what if one does believe cruelty and the like to be univalent? The first thing to say is that, **even if there are exceptionless moral generalizations** functioning as higher-order laws in morality, this doesn’t itself obviate the (now **lower-order**) lawlikeness of the generalizations concerning our old friends lying, promise-keeping, and the infliction of pain. Higher-order laws, it turns out, can’t do all the heavy lifting. To give an example of Lange’s, it might be the case that all the phenomena of island biodiversity can be unified as instances of Darwinian survival strategy; pointing to laws at that higher level, that is, may unify and constrain patterns of behavior at the level of islands. Nonetheless, there are inferences – the raison d’être of theoretical principles – we can **make only by invoking the lower-level laws.** Laws of island biodiversity allow us to predict with fair accuracy, for instance, the population of a species given only the size of the island, something that cannot be done within Darwinian theory, which makes no mention of islands. Higher-level laws, in short, even where they exist, often fail to capture the content of laws at a lower level. Lower-level laws retain autonomous value. Second, once we realize that genuine laws admit of exception, space opens for a more radical rejoinder. For once we realize this, pressure is placed on why one should believe that exception-filled laws must be backed up at some higher level by a strict one. It places pressure, that is, on any ex ante commitment to the claim that exception-laden laws depend, for their existence, on exceptionless ones. Again, one may have a particular view about morality – here, about its metaphysical backing rather than its first-order normative structure – that implies the existence of strict higher-order moral laws. A Natural Law theorist, or again a Platonist about morality, is committed to the existence of strict moral laws that determine everything’s ethical nature, in much the same way the laws of physics determine all physical nature. But for those who have an essentially **organic, practice-based notion** of morality, according to which morality is **objective but not transcendent**, **there may be no hidden “scientific moral image” lying behind the manifest one.**15 Given the practice we find ourselves engaged in – and only from the perspective of such engagement – we have a sense of the point of that practice, and an understanding of our goals and purposes that allows us to amend that practice. But apart from our skillful involvement with it, we could not formulate any conception of its point, much less produce a codified theory of it that could be used to determine appropriateness within the practice. Moral understanding, while drenched in exception, is understanding of a structure, not merely a series of instances. What one comes to understand is a complex whole, in which intuitions about cases, privileged conditions, and compensatory moves all exert leverage on one another..

#### Moral principles frequently have exceptions—it’s not that nothing’s universal, but there’s no way to compare or codify values independent of context

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Moral particularists like exceptions. At any rate, they regard exceptions as **ubiquitous to moral principles**; more importantly, they view them as friend rather than foe. This is of course simply to state their philosophical intuition. We believe, though, that it’s the right intuition; and in this paper, we try to say why. In doing so, we will argue more to the second point than the first. We’ll be concerned less with demonstrating that the right moral principles in fact irreducibly admit of exception, and more with demonstrating that, if such exceptions do (as we suspect) exist, they should be tolerated and indeed embraced. This distinction points to two quite different bases for objecting to the type of moral particularism we’ll be developing. The first, about which we’ll have less to say, stems from substantive moral commitments. One might well believe that, all things considered, the best moral theory is one that in fact ends up cleaning up all exceptions; if so, one certainly won’t be a particularist. Resistance to particularism thus sometimes reflects commitment to a view such as **Kant**’s about lying, say, or the **util**itarian’s about pain, on which it turns out that lying is always wrong-making and pain always bad-making. This is a stance we respect (though we do not agree with it). After all, even those who believe that exceptions can be important must agree that **not all realms admit of them**. Physics, for instance, may well be a system susceptible to a codifiable structure of exceptionless laws (though its exceptionless laws may ending up having statistical quantifiers embedded in them); and even those who are particularists about physics would agree that we could, at any rate, make up a game whose every move is governed by a finite set of exceptionless rules. For many people, though, resistance to moral particularism stems not from any ex ante commitment to a given normative theory. It stems, instead, from commitment to an extra-moral view about the nature of explanation. It stems from a conception of the way in which reasons and explanation must function in any realm – namely, by subsumption under strict theoretical generalizations or laws. According to this view, exceptions stand in the way of genuine explanation. Those committed to such a picture will regard the presence of moral exceptions as an embarrassment to the theoretical task of moral understanding and justification: morality had better be secured by a structure that doesn’t admit of exception, on pain of morality’s demotion to second-class epistemic status. The answer to this sort of resistance is provision of a different model of explanation. We believe that, while reasons and explanation can travel by way of subsumption under strict laws, it is a deep mistake to think they always do – a mistake which, unless resisted, will obscure some of the richest views available. For some realms, ethics included, understanding and expertise is, at its heart, **a matter of understanding, not eliminating, exception**. Exceptions and Explanation Few people believe that lying is always wrong. After all, there may be some contexts in which another moral duty or principle – relief of terrible suffering, say – proves more important. Except where we are prepared to be absolutist, then, claims about the all-things-considered rightness or wrongness of following a given duty will have exceptions. Amongst those who concur with this rather innocuous statement, some believe we can recover a tractable calculus governing the interactions of the various duties or principles that come our way. Perhaps justice is lexically ordered over utility maximization; perhaps we can find a way to render duties’ strengths that will allow us to recover a calculative procedure for balancing them; perhaps specifying the duties to specific roles will allow us to set forth a once-and-for-all ordering of them. Others have set this aside as a misguided project. There is **no algorithm** or quantitative method, they urge, for deciding when justice should trump mercy rather than the other way round, no setting out a way to order or balance the virtues, principles, or duties (take your personal favorite) **independently of context**. Instead, it takes **qualitative judgment** or phronesis to make the comparative judgments in individual cases. Whichever side of that debate one comes down on, though, the vast majority of contemporary philosophers believe that relevant moral duties or features always make the same sort of contribution to a moral situation. Like the forces of physics, but without the vector calculus, we can isolate various moral forces that always push, as it were, in the same moral direction as telling for or against an action. We could put it by inserting a ‘ceteris paribus’ or ‘prima facie’ or ‘pro tanto’ qualifier in front of the claim that ‘lying is wrong’, where those qualifiers function to abstract away possible competing moral considerations. Such a claim is in essence equivalent to asserting an exceptionless connection between lying and a milder moral property: lying may sometimes be morally justified, but it is always wrong-making (see, e.g., Pietrowski 1993). It is here that moral particularists part company. Pain is always bad-making – well, except when it’s constitutive of athletic challenge; intentionally telling a falsehood is prima facie wrong – well, not when done to Nazi guards, to whom the truth is not owed, or when playing the game Diplomacy, where it’s the point of the contest. Pleasure always counts in favor of a situation – well, except when it’s the sadist’s delight in her victim’s agony, where her pleasure is precisely part of what is wrong with the situation.1 It is always wrong-making not to take competent agents at their word; well, not in the S&M room, where ‘no’ precisely does mean ‘yes’. Considerations that in one context tell in favor of an action can in another **go neutral or flip directions entirely**, and all in a way that **cannot be codified** in any helpful concrete way.

#### Permissibility and Presumption negate:

#### 1] Justness – the resolution indicates the affirmative has to prove something as unjust or wrong, and permissibility would deny the existence of wrongness so you presume neg

#### 2] Falsity – Statements are more often false than true because proving one part of the statement false disproves the entire statement. Presuming all statements are true creates contradictions which would be ethically bankrupt.

#### 3] Negating is harder – Aff gets last speech to crystallize and shape the debate in a way the favors them with no 3NR

#### 4] Negation Theory - “to negate” means “to deny the truth of,” which means any argument that renders the resolution false is sufficient to negate.

#### 5] Burden of truth – Aff has the burden of truth and needs to prove the res as true

#### 6] Illogical - negating becomes impossible because all defense becomes offense for the aff

#### 7] Squo Burden – The affs burden is to prove we do anything but the squo so presume neg if the aff can’t prove that

#### 8] Status Quo Bias – you should default to a world where you don’t make change because making change assumes that world will be better than the current world

#### 9] Absent morality nothing is unjust, so you negate

#### 10] Side Burdens – Neg burden is to deny the aff, so proving no reason to do the aff means you negate

#### 11] Infinite prep time – aff gets infinite prep time and chooses the field of the debate so presume against them if they can’t even give a reason why you affirm

#### No new 1AR presumption and permissibility warrants as to why they affirm - becomes a 10-7 timeskew since I don’t get new 2nr justifications

### Offense:

#### A] The Affirmative positions itself as moral principle regarding a situation – This makes morality impossible to achieve since we are now constrained by engrained generalizations that fail to account for exceptions within principles - thus negate on presumption since the 1AC can never contextually justify their moral actions

#### B] Tying morality to principles causes harmful ethical thought – means we can never adjust our thoughts or break principles even if the situation would be better for it

#### C] Affirmative’s generalizations make weighing ethicality between actions impossible – Moral principles will see actions that violate that moral principle as ethically the same – Means we can never decide between conflicting principles and causes the inability to make decisions – Means even if moral principles are good, they make it impossible to act under principles

#### D] Principles are epistemologically circular – “X action is bad to do because it is bad” means we never form justifications for why we should or shouldn’t undergo actions. Principles are self-referential in their justification for that principle’s existence – means principles fall apart on inspection leaving no ground for moral thought. Need contextual situation to epistemologically from reasoning – knowledge formation can’t be generated outside of engagement with ethical contexts

## Case:

#### On the ROB

#### 1] Aff fails to question the affs relation to educational institutions, means you vote neg on presumption

#### 2] we are impact turing your framework, means any offense on it means you can't vote aff

#### 3] the RoB is to vote for the best idea. Prefer a) predictable, all other frameworks are arbitrary and can't weigh between contesting sides fairly. This is k2 clash and engagement on framework because otherwise both sides would just lock each other out of each others framework

#### A2 Fwk writ large –

#### They were hella shifty in cross when I asked them why do we care about this new method of forming meaning, and all they said was that it’s a pre-req to forming meaning. But no a person can call everything a rock and that becomes meaning for them, obviously this would cause problems in treating other people, but they don’t have to change. Aka they set the ontology of everything as static yet still have personal meaning. If the aff thinks this meaning is bad they forfeit some value to the consequences of this thing, so then you go for a consequentialist ethic.

#### Extinction outweighs ontology – ontological capacity is inevitable – only extinction prevents true freedom

(Hans, Former Alvin Johnson Prof. Phil. – New School for Social Research and Former Eric Voegelin Visiting Prof. – U. Munich, “Morality and Mortality: A Search for the Good After Auschwitz”, p. 111-112)

With this look ahead at an ethics for the future, we are touching at the same time upon the question of the future of freedom. The unavoidable discussion of this question seems to give rise to misunderstandings. My dire prognosis that not only our material standard of living but also our democratic freedoms would fall victim to the growing pressure of a worldwide ecological crisis, until finally there would remain only some form of tyranny that would try to save the situation, has led to the accusation that I am defending dictatorship as a solution to our problems. I shall ignore here what is a confusion between warning and recommendation. But I have indeed said that such a **tyranny would still be better than total ruin**; thus, I have ethically accepted it as an alternative. I must now defend this standpoint, which I continue to support, before the court that I myself have created with the main argument of this essay. For **are we not contradicting ourselves in prizing physical survival at the price of freedom**? Did we not say that freedom was the condition of our capacity for responsibility—and that this capacity was a reason for the survival of humankind?; **By tolerating tyranny as an alternative to physical annihilation are we not violating the principle we established: that the How of existence must not take precedence over its Why? Yet we can make a terrible concession to the primacy of physical survival in** **the conviction that the ontological capacity for freedom, inseparable as it is from man's being, cannot really be extinguished, only temporarily banished from the public realm. This conviction can be supported by experience we are all familiar with. We have seen that even in the most totalitarian societies the urge for freedom on the part of some individuals cannot be extinguished, and this renews our faith in human beings**. Given this faith, we have reason to hope that, **as long as there are human beings who survive**, **the image of God will continue to exist along with them and will wait in concealment for its new hour.** **With that hope**—which in this particular case takes precedence over fear—**it is permissible, for the sake of physical survival, to accept if need be a temporary absence of freedom in the external affairs of humanity**. This is, I want to emphasize, a worst-case scenario, and it is the foremost task of responsibility at this particular moment in world history to prevent it from happening. This is in fact one of the noblest of duties (and at the same time one concerning self-preservation), on the part of the imperative of responsibility to avert future coercion that would lead to lack of freedom by acting freely in the present, thus preserving as much as possible the ability of future generations to assume responsibility. But more than that is involved. **At stake is the preservation of Earth's entire miracle of creation, of which our human existence is a part and before which man reverently bows**, **even without philosophical "grounding."** Here too faith may precede and reason follow; it is faith that longs for this preservation of the Earth (fides quaerens intellectum), and reason comes as best it can to faith's aid with arguments, not knowing or even asking how much depends on its success or failure in determining what action to take. With this confession of faith we come to the end of our essay on ontology.

#### We can calculate the value of a life

Kirigia, Joses M, and Rose Nabi Deborah Karimi Muthuri. “The fiscal value of human lives lost from coronavirus disease (COVID-19) in China.” BMC research notes vol. 13,1 198. 1 Apr. 2020, doi:10.1186/s13104-020-05044-y

According to the WHO coronavirus disease (COVID-19) situation report 35, as of 24th February 2020, there was a total of 77,262 confirmed COVID-19 cases in China. That included 2595 deaths. The specific objective of this study was to estimate the fiscal value of human lives lost due to COVID-19 in China as of 24th February 2020.

Results

The deaths from COVID-19 had a discounted (at 3%) total fiscal value of Int$ 924,346,795 in China. Out of which, 63.2% was borne by people aged 25–49 years, 27.8% by people aged 50–64 years, and 9.0% by people aged 65 years and above. The average fiscal value per death was Int$ 356,203. Re-estimation of the economic model alternately with 5% and 10 discount rates led to a reduction in the expected total fiscal value by 21.3% and 50.4%, respectively. Furthermore, the re-estimation of the economic model using the world’s highest average life expectancy of 87.1 years (which is that of Japanese females), instead of the national life expectancy of 76.4 years, increased the total fiscal value by Int$ 229,456,430 (24.8%).

**Pleasure and pain have intrinsic value**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues**.** This inclusion makes intuitive sense, moreover, for there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values**.** If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable**.** You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes**:** “We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value.

**Moreover, *only* pleasure and pain are intrinsically valuable. All other values can be explained with reference to pleasure; Occam’s razor requires us to treat these as instrumentally valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

I think several things should be said in response to Moore’s challenge to hedonists. First, I do not think the burden of proof lies on hedonists to explain why the additional values are not intrinsic values. If someone claims that X is intrinsically valuable, this is a substantive, positive claim, and it lies on him or her to explain why we should believe that X is in fact intrinsically valuable. Possibly, this could be done through thought experiments analogous to those employed in the previous section. Second, there is something peculiar about the list of additional intrinsic values that counts in hedonism’s favor: the listed values have a strong tendency to be well explained as things that help promote pleasure and avert pain. To go through Frankena’s list, life and consciousness are necessary presuppositions for pleasure; activity, health, and strength bring about pleasure; and happiness, beatitude, and contentment are regarded by Frankena himself as “pleasures and satisfactions.” The same is arguably true of beauty, harmony, and “proportion in objects contemplated,” and also of affection, friendship, harmony, and proportion in life, experiences of achievement, adventure and novelty, self-expression, good reputation, honor and esteem. Other things on Frankena’s list, such as understanding, wisdom, freedom, peace, and security, although they are perhaps not themselves pleasurable, are important means to achieve a happy life, and as such, they are things that hedonists would value highly. Morally good dispositions and virtues, cooperation, and just distribution of goods and evils, moreover, are things that, on a collective level, contribute a happy society, and thus the traits that would be promoted and cultivated if this were something sought after. To a very large extent, the intrinsic values suggested by pluralists tend to be hedonic instrumental values. Indeed, pluralists’ suggested intrinsic values all point toward pleasure, for while the other values are reasonably explainable as a means toward pleasure, pleasure itself is not reasonably explainable as a means toward the other values. Some have noticed this. Moore himself, for example, writes that though his pluralistic theory of intrinsic value is opposed to hedonism, its application would, in practice, look very much like hedonism’s: “Hedonists,” he writes “do, in general, recommend a course of conduct which is very similar to that which I should recommend.”24 Ross writes that “[i]t is quite certain that by promoting virtue and knowledge we shall inevitably produce much more pleasant consciousness. These are, by general agreement, among the surest sources of happiness for their possessors.”25 Roger Crisp observes that “those goods cited by non-hedonists are goods we often, indeed usually, enjoy.”26 What Moore and Ross do not seem to notice is that their observations give rise to two reasons to reject pluralism and endorse hedonism. The first reason is that if the suggested non-hedonic intrinsic values are potentially explainable by appeal to just pleasure and pain (which, following my argument in the previous chapter, we should accept as intrinsically valuable and disvaluable), then—by appeal to Occam’s razor—we have at least a pro tanto reason to resist the introduction of any further intrinsic values and disvalues. It is ontologically more costly to posit a plurality of intrinsic values and disvalues, so in case all values admit of explanation by reference to a single intrinsic value and a single intrinsic disvalue, we have reason to reject more complicated accounts. The fact that suggested non-hedonic intrinsic values tend to be hedonistic instrumental values does not, however, count in favor of hedonism solely in virtue of being most elegantly explained by hedonism; it also does so in virtue of creating an explanatory challenge for pluralists. The challenge can be phrased as the following question: If the non-hedonic values suggested by pluralists are truly intrinsic values in their own right, then why do they tend to point toward pleasure and away from pain?27

Moral uncertainty means preventing extinction should be our highest priority.  
**Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections onmoral uncertainty suggestan alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶Our present understanding of axiology might well be confused. We may not now know — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet be able to imagine the best endsof our journey. If we areindeedprofoundlyuncertainabout our ultimate aims,then we should recognize thatthere is a greatoptionvalue in preserving— and ideally improving — our ability to recognize value and to steer the future accordingly. Ensuring that there will be a future version of humanitywith great powers and a propensity to use them wiselyisplausibly the best wayavailable to us to increase the probability that the future will contain a lot of value. To do this, we must prevent any existential catastrophe.

#### [1] Death outweighs— [a] agents can’t act if they fear for their bodily security—my framework constrains every NC and K and [b] it’s the worst form of evil

Paterson 3 – Department of Philosophy, Providence College, Rhode Island (Craig, “A Life Not Worth Living?”, Studies in Christian Ethics.

Contrary to those accounts, I would argue that it is death per se that is really the objective evil for us, not because it deprives us of a prospective future of overall good judged better than the alter- native of non-being. It cannot be about harm to a former person who has ceased to exist, for no person actually suffers from the sub-sequent non-participation. Rather, death in itself is an evil to us because it ontologically destroys the current existent subject — it is the ultimate in metaphysical lightening strikes.80 The evil of death is truly an ontological evil borne by the person who already exists, independently of calculations about better or worse possible lives. Such an evil need not be consciously experienced in order to be an evil for the kind of being a human person is. Death is an evil because of the change in kind it brings about, a change that is destructive of the type of entity that we essentially are. Anything, whether caused naturally or caused by human intervention (intentional or unintentional) that drastically interferes in the process of maintaining the person in existence is an objective evil for the person. What is crucially at stake here, and is dialectically supportive of the self-evidency of the basic good of human life, is that death is a radical interference with the current life process of the kind of being that we are. In consequence, death itself can be credibly thought of as a ‘primitive evil’ for all persons, regardless of the extent to which they are currently or prospectively capable of participating in a full array of the goods of life.81  In conclusion, concerning willed human actions, it is justifiable to state that any intentional rejection of human life itself cannot therefore be warranted since it is an expression of an ultimate disvalue for the subject, namely, the destruction of the present person; a radical ontological good that we cannot begin to weigh objectively against the travails of life in a rational manner. To deal with the sources of disvalue (pain, suffering, etc.) we should not seek to irrationally destroy the person, the very source and condition of all human possibility.82

#### [3] Only consequentialism explains degrees of wrongness—if I break a promise to meet up for lunch, that is not as bad as breaking a promise to take a dying person to the hospital. Only the consequences of breaking the promise explain why the second one is much worse than the first which is the most intuitive. That outweighs:

#### [A] Parsimony – metaphysics relies on long chains of questionable claims that make conclusions less likely.

#### [B] Hijacks – intuitions are inevitable since even every framework must take some unjustified assumption as a starting point.

**Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections on **moral uncertainty suggest** an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ **Our present understanding of axiology might** well **be confused. We may not** nowknow — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet **be able to imagine the best ends** of our journey. **If we are** indeedprofoundly **uncertain** about our ultimate aims,then we should recognize that **there is a great** option **value in preserving** — and ideally improving — **our ability to recognize value and** to **steer the future accordingly. Ensuring** that **there will be a future** version of **humanity** with great powers and a propensity to use them wisely **is** plausibly **the best way** available to us **to increase the probability that the future will contain** a lot of **value.** To do this, we must prevent any existential catastrophe.

**Reducing the risk of extinction is always priority number one.   
Bostrom 12** [Faculty of Philosophy and Oxford Martin School, University of Oxford.], Existential Risk Prevention as Global Priority.  Forthcoming book (Global Policy). MP. http://www.existenti...org/concept.pdfEven if we use the most conservative of these estimates, which entirely ignores the   possibility of space colonization and software minds, we find that the expected loss of an existential   catastrophe is greater than the value of 10^16 human lives.  This implies that the expected value of   reducing existential risk by a mere one millionth of one percentage point is at least a hundred times the   value of a million human lives.  The more technologically comprehensive estimate of 10  54 humanbrain-emulation subjective life-years (or 10  52  lives of ordinary length) makes the same point even   more starkly.  Even if we give this allegedly lower bound on the cumulative output potential of a   technologically mature civilization a mere 1% chance of being correct, we find that the expected   value of reducing existential risk by a mere one billionth of one billionth of one percentage point is worth   a hundred billion times as much as a billion human lives. One might consequently argue that even the tiniest reduction of existential risk has an   expected value greater than that of the definite provision of any ordinary good, such as the direct   benefit of saving 1 billion lives.  And, further, that the absolute value of the indirect effect of saving 1  billion lives on the total cumulative amount of existential riskâ€”positive or negativeâ€”is almost   certainly larger than the positive value of the direct benefit of such an action.

#### Smart cities k2 solve sustainability and climate change

Allam 20 The Case for Autonomous Smart Cities in the Wake of Climate Change. Chapter 5 pg 61-70 The Rise of Autonomous Smart Cities Technology, Economic Performance and Climate Resilience by Zaheer Allam Zaheer Allam is an Urban Strategist working across the African Continent on urban regeneration strategies. He is also the African Representative of the International Society of Biourbanism, and a member of the Advisory Circle of the International Federation of Landscape Architects. //avery

Cities around the world occupies only 3% of the earth’s surface area but are responsible for more than 75% of global carbon emissions (UN Environment Programme 2020; Satterthwaite et al. 2010). Despite occupying such a small area, they are home to over 54% of the global population, with the numbers projected to increase to 68–70% of 8.5 billion 62 people that will be living on earth by 2030 (United Nations 2018). Such numbers are due to the positive reputation that cities have in respect to economic opportunities, liveability status and conglomeration of diverse quality services like education, health and transportation to name a few. They are also seen as safe havens relative to rural areas that are confronted by numerous challenges like reduced agricultural productivity following unpredictable weather conditions and out-migration of youthful population. Rural areas also offer limited opportunities in the economic and social spheres- in education, health and recreation. However, such are far much advanced in cities just as they are more accessible. In respect to the above synopsis, it is worth noting that the liveability levels and opportunities being pursued in cities are unfortunately negatively impacted by the same economic drivers that make them attractive. That is, in the pursuit for economic growth, increased housing, construction of transport infrastructures and increase energy production to meet the surging demand among other related activities leads to massive emissions, excessive waste generation and excessive consumption of resources. Such negatives increase as more industries are constructed to increase production, more automobiles are introduced, rendering people more dependent on them, and demand for manufactured products fueled by changing consumption behaviors increases. Such trends are noted in the New Urban Agenda (NUA) (United Nations 2016) and others (UN Habitat 2011; IEA and UNEP 2018; UN Habitat 2018) as some of the urban challenges that cities have to accommodate with until there is a paradigm shift in the way issues pertaining to social inclusion, sustainability, resiliency and environmental protection are given due attention. The need for the said paradigm shift is pegged among other issues; on the increasing role of cities in contributing to climate change, which in turn has contributed to numerous global challenges of the twenty-frst century (Allam 2019). On this front, there are numerous regional and international agendas that are being pursued and advanced to address climate change and its impacts on the global sphere. Among those include the NUA, the SDGs especially number 11 (UN Environment Programme 2020), the Paris Agreement (United Nations 2015b), The Addis Ababa Action Agenda of the Third International Conference on Financing for Development (United Nations 2015a) and others promoted by United National Framework Convention on Climate Change (UNFCCC). The commonalities in these agendas are that they propose rafts of approaches, Z. ALLAM 63 measures and interventions that have the potential to address matters relating to climate change, urban resilience and liveability status. In line with the above agendas, an emerging concept that is anticipated to have potent solution in addressing climate change is that of smart cities, which is now being pursued in different cities across the globe and have shown fashes of promising outcomes in addressing the urban challenges including those related to climate change (Dabeedooal et  al. 2019). Despite this, as noted by Tompson (2017), the concept is still in its infancy stages, and for this reason, only the private sector has had substantial confdence to fnance and implement them on behalf of cities. For instance, a majority of the fnancing, supply of smart devices, systems, networks, and expertise have all been done by the private sector. While this is one way of bringing the concept into fruition, it has been widely criticized as being driven by proft agendas by said private enterprises. Nevertheless, for maximum benefts to be accrued by both the society at large and by urban administrators, the concept need to graduate from being a private enterprise to a social one in order to be embraced by all, and subsequently offer equal opportunities for all in the regions implemented. As the challenges of climate change are accentuated, there is a need to revisit the smart cities concept. In particular, as will be argued in this chapter, the revisit is paramount as some aspects, especially certain urban governance decisions will need to be automated to allow for realistic opportunities to achieve better sustainability levels. This is possible as there are now advanced technologies based on Artifcial Intelligence (AI) (McGovern et al. 2017; Anttiroiko et al. 2014) and Internet of Things (IoT) (Angelidou et al. 2018) that allow smart components to communicate via networks with minimum intervention of humans. Such have been demonstrated in areas like the transportation sector where spirited efforts and focus have been placed in producing autonomous vehicles that, among other things will not require human intervention. With such, as argued by Kim et al. (2012), they will help optimize resource consumption, as most of them, for instance, will be powered by renewable energy. They are also hailed for their potential to reduce air pollution (Rafael et al. 2020) and also reduce human related errors that usually leads to accidents, traffc congestion and many other issues (Kaur and Rampersad 2018). Full automation in this sector and others will see cities accrue even greater benefts like reduced costs, and reduce their over-reliance on proftoriented private enterprises. The case of autonomous cars is one of many that demonstrates how automation of urban process can reduce human 5 THE CASE FOR AUTONOMOUS SMART CITIES IN THE WAKE OF CLIMATE… 64 intervention and consequently, beneft urban resident for a higher urban liveability. As will be demonstrated in the succeeding section, automation can have greater impacts in even addressing issues of climate change on urban infrastructure. Climate Change and Urban Infrastructural Losses The impacts of climate change are now more pronounced across the globe, as they are being experienced even in developed economies, though they have advanced infrastructure investments and being fnancially endowed to be able to implement mitigation programs. Issues like extreme temperatures (increased temperatures and extreme cold/hot weather) are now rampant in areas like Europe, Asia and even Africa without respect to developmental status. The temperatures have resulted into destruction of infrastructures, increased morbidity and in the worse-case scenarios, have resulted in losses of life. Such have prompted alarms from various quarters, including global organizations like UN Habitat (UN Habitat 2015), UNFCCC (Nations 2019) and other bodies (IEA and UNEP 2018; UNEP 2016; IPCC 2018). Subsequently, these have prompted the formulation of policies that target activities and processes in cities, and in entire economies at large. Among the most prominent ones include the New Urban Agenda (NUA), the Sustainable Development Goal (SDG) 11, the Sendai framework and Paris Agreement amongst many others. These in their own rights clearly denotes sustainability dimensions in line with addressing urban development to better respond to climate change and infuence the liveability status in cities. These, especially the Sendai framework, also target the reduction of losses emanating from climate change disasters that are on the rise (UNDRR 2015). After the formulation of these policies, positive strides have been made across the globe and many countries are seen to increase their commitments toward reducing emissions that are responsible for climate change (UNDP 2010; Yeo 2019). For instance, in respect to the Paris Agreement, until today, 187 out of the 197 parties to the convention have ratifed the agreement (UNFCCC 2016). In regard to the SDGs and NUA, it has been observed that countries have already amended some of their policies to align with these global policies (Sinha et al. 2020). However, while the achievement in cities as a result of the above policy interventions are evident, they have been criticized as not being enough in view of increasing dramatic natural disasters (Simon et al. 2015). And, if Z. ALLAM 65 the number of disasters, and their subsequent impacts in urban areas are to be respected, it would be safe to argue that the criticisms are justifed. For instance, in 2019, almost fve years after the Paris Agreement, some South African countries were hit by one of the harshest climate change instigated cyclones (Idai and Kenneth). Cyclone Idai alone left a trail of damages surpassing $773 million in infrastructure and more than 100,000 homes destroyed (World Vision 2019). Cyclone Kenneth was responsible for destruction of infrastructure worth more than $100 million in the same regions (AFDB 2019). Together, these are accused for having displaced over 2.2 million people and leaving more than 1,000 dead (UNCHA 2019). More recently, in Australia, in the wake of 2020, extreme heat and strong winds are being accused of dramatically escalating the wildfre disaster that have engulfed the continent claiming over 24.5 million acres of land (BBC 2020), killing over a billion animals (Samuel 2020), and at the time of writing this chapter, more than 28 people were reported to have lost their lives (BBC 2020). A report by Burbank et al. (2014) showcased that due to extreme heats, over 70,000 lost their lives in Europe in 2003. In Vermont, US, the report highlighted that in 2011, a tropical storm (Irene) led to the destruction of over 2,000 roads, 1,000 culverts and approximately 200 miles of railway and over 200 bridges to be closed resulting into major transportation problem. The above fgures represent only a very small percentage of what the world is experiencing as events instigated by climate change keep on increasing; thus, justifying the calls for increased urgency in addressing matters climate change. It is noted that cities located within coastal regions are particularly more vulnerable to climate change instigated events due to their location. On this, it has been found that these areas experience frequent storms, strong winds, high temperatures and fooding relative to their counterpart located inlands (UN Habitat 2015; Cottrell et al. 2015). Such happenings are mostly infuenced by human induced activities like the over-reliance on non-renewable energy sources, over-exploitation of coastal resources and other activities that causes erosions and many others that in turn have led to the current challenge of climate change. While the above issues paint a troubling situation, those impacts are not seen to halt in the foreseeable future unless urgent and practical interventions are sought, especially with an aim of preparing urban communities to better respond to climate change. In particular, one of the interventions being pursued is the investment in ‘infrastructural resilience’, where those areas -especially coastal regions, are encouraged to install infrastructural 5 THE CASE FOR AUTONOMOUS SMART CITIES IN THE WAKE OF CLIMATE… 66 programs that could help them withstand the wrath of climate change events. This call have been heeded, and as World Bank (2010) reports, there are spirited efforts even in less developed economies to invest in infrastructural development despite fnancial constraints. On this line, noting that most infrastructural investments are capital intensive; hence, prompting many economies to plunge into debts; deploying novel technologies like smart cities could help in getting the best out of those projects (Chironga et al. 2018; Kuwonu 2016; Lee 2014; UN-Habitat 2014) as will be discussed in the section below. Such technologies, despite being expensive may guarantee valuable assets and may also spur economic development and growth that could, in the long-run, help in meeting debt repayment obligations. Additionally, those have the potential to address notable climate change impacts, especially through early detection and prediction that are made possible by AI technologies like Machine Learning. Climate Change and Urban Technologies As the smart city market continue to enlarge, ICT Corporations are seen to also increase their activities in the feld. In particular, they are seen to invest massively in R&D, such that the products and services they present in the smart cities are of distinct and of high quality; all geared toward winning competitive advantages over others. Globally, in 2019 it is reported that ICT frms invested approximately $239 billion in R&D; a substantial increase from $228.3 billion that was invested in 2018. In 2017, the investments in this sector amounted to $218.3 billion, which was approximately $10 billion increase from the 2016 recorded fgure of $207.7 billion (Duffn 2019). These investments are partly infuenced by the rate at which the smart city concept and that of urban digital solutions have been growing especially in its capitalization. In 2018, IMARC (2020) Group argues that the market was valued at US $312.4 billion and projected that it would reach US$826.3 billion by 2024 at an expected growth rate of 17.6% in the period 2019–2024. Another report by Persistence Market Research valued the global smart cities market at US$622 billion and estimate that it would grow to approximately US$3.48 billion by 2026 (Smart Cities Association 2020). Even if those fgures differ, more so due to differing methodologies, those show that the smart cities market are infuenced by the global increase in government Z. ALLAM 67 investment in urban digital solutions to remain abreast with the unprecedented rate of increase in urbanization. In view of the above, there is an increase in investments in smart-cityoriented digital solutions focusing on areas like weather forecasting, biking, smart irrigation, smart waste management solutions and others geared toward rendering cities more resilient. These, in their own rights have been seen to bring outstanding changes on how the urban fabric is structured. For instance, in respect to weather forecasting, such technologies like the use of mobile apps to monitor weather have been further developed and are helping in urban decision making in areas like transport, water usage, and in mitigation strategies to name a few. Bauer et al. (2015) express that using available urban data, it is now possible to conduct numerical weather predictions, which are similar to brain simulations. McGovern et al. (2017) explain that this is possible due to the integration of prediction methods powered by AI technologies, which are helping cities make real-time decision on areas like investment in alternative energy. With such predictions, cities are seen to increase avenues for savings on their costs; which is paramount in increasing the efficiency of urban management. Further to this, with smart irrigation, Cano et al. (2018) express how it is now possible to remotely control irrigations systems; thus, improve in novel water saving technique, ensure public green spaces are well managed and soil moistures are monitored. Such technologies have been deployed in smart city Barcelona and is hailed for the way it has achieve remarkable outcomes in management of water networks and resources Libelium (2016). While most urban smart technologies have proven to achieve unquestionable outcomes in making cities resilient and liveable, they still heavily rely on data. On this, though most are able to allow for easy collection and analysis of data and subsequently provide deep insights, they are in most cases unequipped with the power to generate actionable results. Therefore, such rely on human interventions, especially in respect to interpretation for actionable outputs. Here, the real issue of maximization of benefts of smart cities arises, particularly for relying on human decision making. From literature, most smart cities data are collected and handled by third parties, especially the proft-oriented enterprises. Those ICT companies (often international monopolies) cause friction with local companies and startups by denying them total access to data. In other cases, they have been accused of commercializing the data for their sole private gains. Compounding all these data challenges serve as pointers to challenges that 5 THE CASE FOR AUTONOMOUS SMART CITIES IN THE WAKE OF CLIMATE… 68 may arise when dealing with increasing performance of resilience programs and effciency of disaster responses. Among those challenges is the universal acceptability of the projects, especially by the citizens who may feel cheated if their data is to be controlled by third parties, of whom they may not have privy information of their mandate in smart city implementation. The local companies and startups may also be unable to offer solutions and this would expose the market to total exploitation by the private sectors and all those in control of said data. Therefore, with that background, it would be necessary to ponder on the imperative of how to render more effcient resilience programs through automation in respect to climate change; where on this the democratization of technology is key in order to render a more inclusive economic landscape. On the Ethics of Climate Action and Urban Policies In view of the increasing challenges on climate, and the calls by global organizations, local governments have the imperative to work on policy decisions and their enactment. This is further accentuated since the consequences of climate change are heavily endured in urban areas, resulting indirect impacts on the economy, social sphere, the environment, and political landscape. On the economic front, the vulnerability of urban infrastructures (Forzieri et al. 2018), the urban fabric and other aspects of urban areas are enough to cause a reversal or slowdown of economic achievements, rendering unprecedented losses and negative outcomes. For instance, with wavering economic environments characterized by insuffcient, unreliable, and dilapidated infrastructures, it would be hard for a city to attract investors, new talents that spur innovations, or tourists. In addition, such infrastructures, as explained by Moretti and Loprencipe (2018), can attract extra costs like those of maintenance and construction, linked to those new infrastructural structures. In addition, such are seen to plunge cities into debt cycles as local managements are pressured to secure loans from different sources to address the infrastructural shortages. More still, urban areas are forced to incur costs associated with rebranding as they try to win back the confdence of investors, tourists and other stakeholders who may have shifted their attention, investments, and interests somewhere else. Here, climate change is understood to cause problems like the displacement of people, whom, in most cases are seen to end up in informal settlement areas. Others are forced in the outcasts of the cities; Z. ALLAM 69 thus, increasing the problems of urban sprawl. In extreme events, those have been seen to lead to loss of lives and injuries in different cities across the globe. The ripple effects of such is increased costs in health, negative impacts on the economy and on the reputation of the city. In respect to the environment, it is evident that the current situation have been worsening with climate change consequences such as extreme temperatures, flooding, rise in sea levels, loss of biodiversity and emergence of new invasive species being witnessed. Politically, the issue of climate change has seen an escalation of disharmony between different countries, as a disagreement on issues related to environmental responsibility, decarbonization, reduction of emissions and commitment to international agreements continue to be observed (Zhang et al. 2017). The fact that all those consequences of climate change on communities and impacts on their survival highlight an ethical imperative where speedy action is needed; supporting that urban policies need to be realigned in order to better respond to this global urgency. In this case the SDG 11 and the NUA provide good guidelines on what needs to be done to ensure the plight of locals are factored in when talking development. Such need to inform the local realignment, such that the policies are focused on ensuring that those two global policies are achieved. On this, the adoption and use of advanced smart urban technologies can help achieve the objectives set in the two policy documents. From the literature, it is clear that diverse technologies such as IoT, AI (Calo 2017), Big Data (Ivanov and Gnevanov 2018; Osman et al. 2017; Batty 2012), Crowd Computing and ANNs (Kotenko et al. 2015; Lee et al. 2016; Huang 2017) among many others are available to be harnessed not only to make urban areas smart, but also to help in automation of processes and activities. By so doing, it would be possible to minimize, or even eliminate human interventions in decision making that have been argued to distort the objectives set in both global and local climate change policies. The pursuit of automation of cities need to be hastened, especially if that can provide a lifeline in the actualization of the Paris Agreement, allow for quicker implementation of SDG 11 and of other global proposed interventions mentioned in this document. While contemporary literature may portray the smart city concept emphasized in this chapter as a futuristic scenario, its promises in making urban areas more liveable, resilient, sustainable and socially inclusive. On this, the pertinent question that need to be asked is when and how the concept can be adopted and implemented fully in all cities so that the deep 5 THE CASE FOR AUTONOMOUS SMART CITIES IN THE WAKE OF CLIMATE… 70 ethical and moral issues that appertains to communities, access and usage of data and the role of third parties in managing same can be addressed comprehensively. Macrorie et al. (2019) highlight that the automation of cities, especially through the use of robots and machines could help reduce the apprehensiveness that people have in sharing their data as in most cases, such are handled by the third party. Here, though Macrorie et al. (2019) acknowledges that automation also raise some concerns, it is possible to address such if there is openness and transparency in the handling of data collected from the urban fabrics and from the citizenry found in these cities. As the benefts of technology in cities are apparent, and the challenges of climate change are highlighted and seen to impact on the livelihood of urban, rural and coastal communities, it can be argued that it is an ethical imperative to adopt the concept of automation of smart cities to ensure that more timeline and effcient solutions are adopted in response to complex climate issues

#### Smart cities key to make urban growth sustainable

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A large amount of land-use, environment, socio-economic, energy and transport data is generated in cities. An integrated perspective of managing and analysing such big data can answer a number of science, policy, planning, governance and business questions and support decision making in enabling a smarter environment. This paper presents a theoretical and experimental perspective on the smart cities focused big data management and analysis by proposing a cloud-based analytics service. A prototype has been designed and developed to demonstrate the effectiveness of the analytics service for big data analysis. The prototype has been implemented using Hadoop and Spark and the results are compared. The service analyses the Bristol Open data by identifying correlations between selected urban environment indicators. Experiments are performed using Hadoop and Spark and results are presented in this paper. The data pertaining to quality of life mainly crime and safety & economy and employment was analysed from the data catalogue to measure the indicators spread over years to assess positive and negative trends.

Introduction

ICT is becoming increasingly pervasive to urban environments and providing the necessary basis for sustainability and resilience of the smart future cities. With the rapid increase in the presence of Internet of Things (IoT) and future internet [1,2] technologies in the smart cities context [3-5], a large amount of data (a.k.a. big data) is generated, which needs to be properly managed and analysed for various applications using a structured and integrated ICT approach. Often ICT tools for a smart city deal with different application domains such as land use, transport and energy, and rarely provide an integrated information perspective to deal with sustainability and socioeconomic growth of the city. Smart cities can benefit from such information using big, and often real-time, cross-thematic data collection, processing, integration and sharing through inter-operable services deployed in a cloud environment. However, such information utilisation requires appropriate software tools, services and technologies to collect, store, analyse and visualise large amounts of data from the city environment, citizens and various departments and agencies at city scale to generate new knowledge and support decision making.

The real value of such data is gained by new knowledge acquired by performing data analytics using various data mining, machine learning or statistical methods. However, the field of smart city based data analytics is quite broad, complex and is rapidly evolving. The complexity in the smart city data analytics manifests due to a variety of issues: i) Requirements of cross-thematic applications e.g. energy, transport, water, urban etc, and ii) multiple sources of data providing unstructured, semi-structured or structured data, and iii) trustworthiness of data [6,7]. In this regard, this paper provides a data oriented overview of smart cities and provides a cloud based analytical service architecture and implementation for the analysis of selected case study data.

Smart cities provide a new application domain for big data analytics and relatively not much work is reported in literature. A review of the state of the art provides very promising insights about applying cloud computing resources for large scale smart city data analytics. For instance, Lu et al. [8] focus on using computational resources for large scale data for climate having complex structure and format. Using a multi scale dataset for climate data, they demonstrated a cloud based large scale data integration and analytics approach where they made use of tools such as RapidMiner and Hadoop to process the data in a hybrid cloud. Among others, the COSMOS project [9] provides a distributed on-demand cloud infrastructure based on Hadoop for analysing Big Data from social media sources. The infrastructure has the capability to process millions of data-points that would take much longer on a desktop computer. It allows social scientists to integrate and analyse data from multiple non-interoperable sources in a transparent fashion. Such a Big Data analysis platform can also be useful for smart cities as it would allow decision-makers to collect and analyse data from many sources in a timely manner. Ahuja and Moore [10] provide a state of the art review of the technologies being used for big data storage, transfer and analysis. Qin et al. [11] present challenges of Big data analytics and acknowledge the capabilities of MapReduce and RDBMS to solve these challenges. The main contribution of their work is that they have provided a unified MapReduce and RDBMS based analytic ecosystem to avail complementary advantages from both systems. Recently some studies have investigated the usefulness of data mining techniques to combine data from multiple sources such as by Moraru and Mladenic [12]. They applied Apriori technique, which is rule based data mining technique, to learn rules from data. Although they are able to extract some rules from small scale but they’re unable to learn much on large scale data due to high volume of the data and the limited memory on a single system.

We use a similar approach that is based on MapReduce. Our prototype implementation analyses the Bristol open dataset to identify correlations between selected urban environment indicators such as Quality of Life. We have developed two implementations using Hadoop and Spark to compare the suitability of such infrastructures for Bristol open data analysis.

The remainder of this paper is structured as follows: the next section provides background and rationale in the context of smart cities. Section “An abstract architectural design of the cloud-based big data analysis” provides a data analytics service architecture and design for analytical processing of big data for smart cities. After this, a simple use case based on Bristol open data by identifying needs of information processing and knowledge generation for decision making is presented in Section “A use case: analytics using Bristol open data”. In Section “Prototype implementation” we present the applicability of the proposed solution by implementing a MapReduce based prototype for Bristol open data and discuss outcomes. Finally, we conclude our discussion and present future research directions in Section “Conclusions and future directions”.

ICT and smart cities

Approximately 50% of world’s population live in urban areas, a number which is expected to increase to nearly 60% by 2030 [13]. High levels of urbanisation are even more evident in Europe where today over 70% of Europeans live in urban areas, with projections that this will increase to nearly 80% by 2030 [13,14]. A continuous increase in urban population strains the limited resources of a city, affects its resilience to the increasing demands on resources and urban governance faces ever increasing challenges. Furthermore, sustainable urban development, economic growth and management of natural resources such as energy and water require better planning and collaborative decision making at the local level. In this regard, the innovation in ICT can provide integrated information intelligence for better urban management and governance, sustainable socioeconomic growth and policy development using participatory processes [15].

Smart cities [4] use a variety of ICT solutions to deal with real life urban challenges. Some of these challenges include environmental sustainability, socioeconomic innovation, participatory governance, better public services, planning and collaborative decision-making. In addition to creating a sustainable futuristic smart infrastructure, overcoming these challenges can empower the citizens in terms of having a personal stake in the well-being and betterment of their civic life. Consequently, city administrations can get new information and knowledge that is hidden in large-scale data to provide better urban governance and management by applying these ICT solutions. Such ICT enabled solutions thus enable efficient transport planning, better water management, improved waste management, new energy efficiency strategies, new constructions and structural methods for health of buildings and effective environment and risk management policies for the citizens. Moreover, other important aspects of the urban life such as public security, air quality and pollution, public health, urban sprawl and bio-diversity loss can also benefit from these ICT solutions. ICT as prime enabler for smart cities transforms application specific data into useful information and knowledge that can help in city planning and decision-making. From the ICT perspective, the possibility of realisation of smart cities is being enabled by smarter hardware and software e.g. IoTs i.e. RFIDs, smart phones, sensor nets, smart household appliances, and capacity to manage and process large scale data using cloud computing without compromising data security and citizens privacy [16]. With the passage of time, the volume of data generated from these IoTs is bound to increase exponentially and classified as Big data [17]. In addition, cities already possess land use, transport, census and environmental monitoring data which is collected from various local, often not interconnected, sources and used by application specific systems but is rarely used as collective source of information (i.e. system of systems [18]) for urban governance and planning decisions. Many local governments are making such data available for public use as “open data” [19]. Managing such large amount of data and analysing for various applications e.g. future city models, visualisation, simulations, provision of quality public services and information to citizens and decision making becomes challenging without developing and applying appropriate tools and techniques.

#### Unsustainable urbanization causes extinction by 2050

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By the mid-twenty-first century the world’s cities will be home to approaching eight billion inhabitants and will carpet an area of the planet’s surface the size of China. Several megacities will have 20, 30, and even 40 million people. The largest city on Earth will be Guangzhou-Shenzen, which already has an estimated 120 million citizens crowded into in its greater metropolitan area (Vidal 2010 ).

By the 2050s these colossal conurbations will absorb 4.5 trillion tonnes of fresh water for domestic, urban and industrial purposes, and consume around 75 billion tonnes of metals, materials and resources every year. Their very existence will depend on the preservation of a precarious balance between the essential resources they need for survival and growth—and the capacity of the Earth to supply them. Furthermore, they will generate equally phenomenal volumes of waste, reaching an alpine 2.2 billion tonnes by 2025 ( World Bank )—an average of six million tonnes a day—and probably doubling again by the 2050s, in line with economic demand for material goods and food. In the words of the Global Footprint Network “The global effort for sustainability will be won, or lost, in the world’s cities” (Global Footprint Network 2015).

As we have seen in the case of food (Chap. 7), these giant cities exist on a razor’s edge, at risk of resource crises for which none of them are fully- prepared. They are potential targets for weapons of mass destruction (Chap. 4). They are humicribs for emerging pandemic diseases, breeding grounds for crime and hatcheries for unregulated advances in biotechnology, nanoscience, chemistry and artificial intelligence

#### Smart cities solve extinction --- prevent extinction from overuse of water and essential metals. Also prevents shortages in commodities necessary for life on earth. That’s a conflict filter --- goes nuclear

FDI 12 (Future Directions International, “International Conflict Triggers and Potential Conflict Points Resulting from Food and Water Insecurity Global Food and Water Crises Research Programme”, May 25, <http://www.futuredirections.org.au/files/Workshop_Report_-_Intl_Conflict_Triggers_-_May_25.pdf>)

There is a growing appreciation that the conflicts in the next century will most likely be fought over a lack of resources. Yet, in a sense, this is not new. Researchers point to the French and Russian revolutions as conflicts induced by a lack of food. More recently, Germany’s World War Two efforts are said to have been inspired, at least in part, by its perceived need to gain access to more food. Yet the general sense among those that attended FDI’s recent workshops, was that the scale of the problem in the future could be significantly greater as a result of population pressures, changing weather, urbanisation, migration, loss of arable land and other farm inputs, and increased affluence in the developing world. In his book, Small Farmers Secure Food, Lindsay Falvey, a participant in FDI’s March 2012 workshop on the issue of food and conflict, clearly expresses the problem and why countries across the globe are starting to take note. . He writes (p.36), “…if people are hungry, especially in cities, the state is not stable – riots, violence, breakdown of law and order and migration result.” “Hunger feeds anarchy.” This view is also shared by Julian Cribb, who in his book, The Coming Famine, writes that if “large regions of the world run short of food, land or water in the decades that lie ahead, then wholesale, bloody wars are liable to follow.” He continues: “An increasingly credible scenario for World War 3 is not so much a confrontation of super powers and their allies, as a festering, self-perpetuating chain of resource conflicts.” He also says: “The wars of the 21st Century are less likely to be global conflicts with sharply defined sides and huge armies, than a scrappy mass of failed states, rebellions, civil strife, insurgencies, terrorism and genocides, sparked by bloody competition over dwindling resources.” As another workshop participant put it, people do not go to war to kill; they go to war over resources, either to protect or to gain the resources for themselves. Another observed that hunger results in passivity not conflict. Conflict is over resources, not because people are going hungry. A study by the International Peace Research Institute indicates that where food security is an issue, it is more likely to result in some form of conflict. Darfur, Rwanda, Eritrea and the Balkans experienced such wars. Governments, especially in developed countries, are increasingly aware of this phenomenon. The UK Ministry of Defence, the CIA, the US Center for Strategic and International Studies [CSIS] and the Oslo Peace Research Institute, all identify famine as a potential trigger for conflicts and possibly even nuclear war.