Semantics, Classifications and Evidence in a Model for Global Catastrophic Risks

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ABSTRACT: Life on the surface of the Earth is fragile and can be deteriorated by outside influence, from nature, or inside influence, from humans. We present a macro perspective for the nation state as a knowledge discourse system. To detect what might happen, a surveillance model needs to classify emerging risks prior to occurrence. The state intelligence model presented here helps survey potential macro factors. During risk analysis, a set of risk classification criteria was devised for linking inside and outside influence trigger points that can indicate existential catastrophes. The analysis is based on a classification of current risks rather than distant future potential risks. Each is measured according to its respective impact, and whether or not it is highly probable to occur or recur in the surveillance system. The inside influence is found most probable with a probability of $P \geq 0.4$ compared to outside influence with a probability of $P \geq 0.28$. The State Intelligence Surveillance Analysis Model presented here consists of an 8-by-8 risk matrix or, a 16 risk table with a computable 20.92 trillion risk combinations per second. The relationships between inside and outside influences have been studied and grouped into classification schemes, where it is imagined that one may trigger the other, and by chance, acting autonomously for any type of catastrophe. The current study gives more focus and awareness to classifiers and the problem of which surveillance components to detect, thereby improving simulations, being well aware that the exact calculations for catastrophes are impossible.

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1.0 Introduction

1.1 "Knowledge organization" in risk analysis

The aim of this study is to bring greater clarity or knowledge around the classification and computation of potential risks to the planet as studied by the Nation State as a knowledge discourse system. Dahlberg (2006, 12) defines "knowledge" as a certain "existentiality of a fact or a matter," which later conveys to the "existentiality of a risk attached to it" where human subjects are involved (Bostrom and Ćircović 2008, 2-4). Prior to the following definition about "knowledge," the notion of "existentiality" becomes clear in context (Dahlberg 2006, 12):

> Knowledge is the subjectively and objectively fairly well-founded certainty of somebody about the existence of a fact or a matter. This knowledge is not transferable; it can only be elaborated by somebody's own personal reflection.

Although by this definition, 'knowledge' is always but the knowledge of some thing, which might be a body, we do know, have the experience and certainty about this fact, that it can yet be shared via our ability to deal with the 'things of this world', and by using our linguistic abilities to express our experience and insights (Dahlberg 2006). In this paper the aim is to identify the "existentiality of a risk" (Bostrom and Ćircović 2008, 3) with a factual probability of occurrence related to "things" and "every living person" on Earth. To identify a risk, the classification of knowledge being spread through the problem's past (records), outlines "the subjectivity and objectivity" (Dahlberg 2006, 12) of the problem per se. Moreover, benefiting from the same specific definition above, "knowledge as a fairly well-founded certainty," to one could be, "the existence of a fact or a matter," as quite visible or least distant to occur, and can be elaborated by one's "own personal reflection."

In this paper, dramatic probabilistic scenarios based on research, are collated and sorted using scientific tools (Osińska and Bala 2010) to index relevant information in a focused manner. One could conceive this task as an experience-based system in form of a simulation validating our knowledge about the problem. A structural-based knowledge organization (Gnoli 2008) is useful in putting different disciplines involved in the same problem set, all entangled with risks. From a scientific, political, economic, social, and environmentally-hazardous perspective, one could present that sole focus through a new classification scheme, in form of a knowledge model. This is obtained by using relevant scientific tools to estimate the probability against certainty of the objectivity and subjectivity of the problem. Therefore, by firstly defining the problem, then using the right and relevant information, on a "need-to-know rather than nice-to-know basis" (Solberg Søilen 2005, 38), enables a classifier in the system, to classify its probable risks, thereby surveying them with the right tools. For example, proper archiving, organizing relevant information for specific information search, or efficient means of information retrieval (IR) (Hjørland 2008, Xu and Bernard 2009) from the risk factor, simulating problem scenarios and its outcomes for that factor by a computer algorithm, could be said to be a part of our knowledge organizing system and processes (KOS and KOP). In return, our knowledge domain is expanded to include similar problems as they get defined one-by-one using the same knowledge model.

1.2 Problem definition

Business Intelligence (BI) models are typically made to survey the company's micro environment, that is the variables the company can influence (Solberg Søilen, 2005). Larger companies also have the resources to spend on the surveillance of macro factors affecting their business, but are far less concerned with major risks to the planet even though these are real risks also to businesses. Instead, this is thought to be the responsibility of Nation States. The affecting $\mathbb{X}$ factors in the current problem are defined as follows: Life on the surface of the Earth is very fragile. It can be deteriorated by outside influence, either from outer space or from under the Earth's surface, and inside influence (primarily, human effects, Bostrom and Ćircović 2008). There is a need for a model concept that can help survey all potential factors. In this paper, the layout of these risks is based on a set of classification criteria after defining the problem, the methods in use and a model for the organization. The obtained knowledge in the surveillance model is organized in such a way as to study uncertainties vs. certainties, with respect to time and other risk dimensions for each probability impact. The evaluation of each risk is done after calculating each probability $\mathbb{p}$. From there, the most influential and visible risk is identified, as the least distant for one to experience, by mathematical calculations relevant to the risk variable. For example, a person crossing the road, seeing a car approaching becomes relatively visible, and the more visible, the higher probability of p relative to the risk taken to collide with the car. The visibility factor is the main focus of this study in calculating p's relative to the problem for the organization. The organization must give the risk taker a prediction factor using a reliable knowledge model about the problem. In the given example, this is simply defined when the car is visible enough to the person (risk taker) to get off the car's path, avoiding collision. On a global scale, one may class the risk taker as a nation, company, government, etc.

1.3 Problem organization

For the taxonomy and organization over risks, one should establish a database system with an efficient architecture. This is done by managing inherited knowledge that surveys and detects the explicit influences against the hidden ones to real-time observations on the planet. The focus is to derive predictions from the explicit type (highly visible) in the surveillance model's algorithm. This approach is compared with other studies like Osińska and Bala (2010), to measure up our model for its knowledge organization as well as predictability based on probability p. This is identifiable as follows.

1.4 What's our p?

> Economists like to make people assign quantitative probabilities p to risks. 'What's your p of X?' we often ask, meaning 'what probability do you assign to X happening?' The point is not that anyone has the definitive numbers. The point is rather that explicit probabilities clarify debate, and impose discipline on how beliefs should change as new evidence emerges (Tetlock, 2005). A person says that two risks are both 'serious', it is unclear why he assigns a probability of 2% to one and 0.1% to another. Similarly, if a person says that the probability of an event is 2%, and relevant new information arrives, consistency requires him to revise his probability. How seriously do we take the possibility that a world totalitarian government will emerge during the next 1000 years and last for 1000 years or more? – Bostrom and Ćircović (2008, 516-17).

Despite the complexity and guesswork inherent in answering this question, the foci of our p is conditional, given all the information, the output remains explicit. Meaning that, visible risks as events get updated, and in turn, the p_{new} quantity is more readable and compliant to its predecessor p_{old}, if predicted correctly before any further updates. The longer into the future an event occurs, or $Time + N$, the less probability of predicting it, since more speculative variables must be coupled with historical accounts, assuming all have been reliably reported in our analysis (see also, Solberg Søilen 2005, 56-61). Therefore, the current study aims to formulate this focus based on the events that are visible, and quantify p as high as 1.0, and as low as 0 in the study's risk classification. In fact, the emphasis is on the currently-obvious accounts parallel to the incoming flow of new information that form a steady-state of our knowledge in predicting future events with the same high and low p's. The boundary of this knowledge, as usual, is drawn between tacit knowledge and explicit knowledge, where the focus should readily contain the explicit knowledge from current information which strongly connects it to hidden risks. This forms a predictable pattern based on the explicit type. However, "there is no absolute boarder between these two kinds of knowledge" (Xu and Bernard 2009, 233), where the surveillance model depend on, and there could be an act of coincidence from unknown risks which come from an unexpected flow of new information. In the present model, however, the coincident probability is stressed upon where a visible or explicit p triggers another visible or explicit p according to current piece of information coupled with strong historical accounts. It is scientific-based data rather than speculative reports. For instance, a report of a prophetic type with almost none or very few accounts of what could have happened or not in the past, as well as future claims with no evidence, is strongly avoided when forming the surveillance system. Such p's that could trigger or coincide with other factual p's happening in parallel is what defines the study's risk classification in terms of low vs. high hazard relative to its p interval [0, 1]. For example, a nuclear disaster could definitely trigger an exclusion zone for a certain human population and any living being for a long time period, i.e., the ecological negative effect in that zone, and is the product of this disaster in evidence (e.g., Ivanov et al., 2009). In this case, one explicit p triggered another p, whereas the latter could have been influenced by some outside risk, like an asteroid hit upon a competition of other risks.

1.5 Report structure

The report is structured as follows: Section 2 outlines the surveillance method; Section 3 outlines the objectives to present the taxonomy and organization for the risk classification presented in the later sections; the taxonomy, organization; Section 4 delivers the surveillance matrix, its components, and risk classification based on a summary of mathematical results deduced for each risk factor; Section 5 focuses on related studies as compared, and gives probability p calculations, detailed data and charts; Section 6 outlines the SISAM knowledge organization and a simulation proposal to survey risks; Section 7 provides discussions on the mostly-linked variable amongst risks as a priority deemed to be the responsibility of Nation States; Sections 8-9 conclude this report with future work and studies.

2.0 Methodology

2.1 Surveillance method: a detection to the most visible scenarios as global catastrophic risks

Our surveillance method is developed by referring to scientific work such as Mastrandrea and Schneider (2004), Matheny (2007), Ewing et al. (2010), Pagli and Sigmundsson (2008), Grossi et al. (2008), Solberg Søilen (2005), and documentaries like "Humanity's last days" by Sjöström et al. (2010), and those relevant issues that threaten our survival on planet Earth (existentiality) from Bostrom and Ćircović (2008), as well as future facts and probability of occurrence. This probability is measured in terms of probability factor P, equal to a value between 0 and 1, on an avoidable versus unavoidable scale. What is meant with "avoidable," hereon, is an indication of what constitutes a risk factor, saying that:

Definition 1. The risk is now avoidable once detected according to the priority of risks, or, the degree of risk with respect to time as defined in its p values for the model's surveillance system.

A similar definition by Knight (1971) broadens the latter as the major part of an Intelligence function for a business organization, defining a risk as an event which the company can assure itself against if it is detected, while the company cannot assure itself against uncertainty. Uncertainties are events the company has to live with. To this account, an "unavoidable," or in behavior uncontrollable or irreversible by man, hereon would be:

Definition 2. Is neither possible to avoid the risk once detected, nor controlled when it occurs, whereas this risk is classified as a high risk, such that the event before its close impact, is subject to immediate actions beforehand.

This definition is mapped to worst-case scenarios with either high or low probability risk, but with less or almost no scientific proof, or substantially a recently experienced issue or observation available in databases (DBs). For example, a scientifically-based statement, hypothesis or a mathematical predicate representing: an asteroid with a size of 15 kilometers has hit the planet 65 million years ago, and about to occur again shortly, conveys to the definition above. On the other hand, scenarios like nuclear disasters, large-scale earthquakes, Tsunamis, etc. are the most evident, since they have been experienced and yet their large scale version would likely to occur in a near future. A major asteroid hit changing the face of the planet, nuclear disaster, mass virus attacks, involving all humans, etc. is always our concern, as information and the number of intelligent decisions grow.

3.0 Taxonomy and Organization

Let us look more closely at what would, and would not, count as a global catastrophic risk. "Recall that, the damage must be serious, and the scale is global. Given this, a catastrophe that caused 10,000 fatalities or 10 billion dollar worth of economic damage (e.g., influenza pandemic) would count as a global catastrophe, even if some region of the world escaped unscratched" (Bostrom and Ćircović 2008, 2). Therefore, we class hazardous events of this type proportional to probability p calculated per region, as a valid measurement, or beyond the region of a global scale.

In summary, the most important issues were gathered as deducible facts based on currently available and past information (historical), and calculated each probability p with a level of concern using concept in Figure 1 for each scenario. The "level of concern" here, associates a risk factor of which, *high* (in Figure 1) indicates beyond life-based entities and monetary compensations within the environment's atmosphere, and *low* or *medium* risk from the same figure, indicates that, survival is possible under compensable circumstances in due course after the event. The concern level is given in our thorough analysis section 5, relative to surveillance costs per person in section 6. Figure 1 is highly three-dimensional when one risk is analyzed per se, and is multi-dimensional when a risk is antecedent to other consequent risks (one triggering another). The hazardous and probability variables

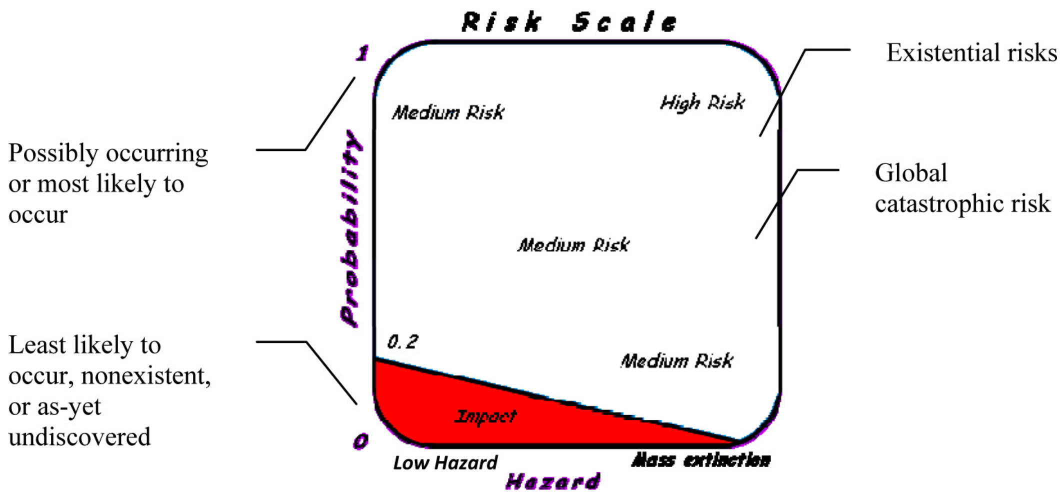

Figure 1. Qualitative categories of risk with impact probability and hazard scale. This is a simplified adaptation of Figure 1.1, (three-dimensional) by Bostrom and Ćircović (2008, 3). The current figure, however, leads to n-dimensional antecedents along the probability dimension.

constitute the risk scale (cosmic?) as well as intensity (hellish?) relative to the scale of impact. This builds up the level of concern of every human being living on this planet.

In this paper, after introducing these concerns and probabilistic scenarios based on old and current facts, a reliable futurology concept (next paragraph) is deduced for the most controllable scenario at hand, taking a BI action from a macro level to all business operating organizations (Solberg Søilen, 2005). Something controllable by man should not need to lead to something bad or catastrophic if we can stop it.

3.1 The empirical objectives

We empirically determine potential factors through deducing statements or results from facts and researched excerpts, formulating our past, detecting which variable is the most connected to others as source or cause of a potential disaster. Then, event relationships are deduced as current and near-future effects, using a BI decision model to finalize a decision point on how to classify and prioritize by time (see the time horizon of an unexpected factor X model as defined by Frankelius, in Solberg Søilen 2005) with the most effective risk(s) with a certain cost to conduct the survey per human. The cost is based on the most highly accruable (here, increases in risk growth), and most likely to occur even bearing a negative trend in mind. Primarily, the surveillance cost is calculated by referring to the version presented by Matheny (2007) in aim of reducing the risk of human extinction. Once outlined in an orderly manner this defines our surveillance components responding to the priority of the risk relative to its degree of impact.

4.0 Risk classification and deductions to our Surveillance Components

The specific calculations of the disasters are simplified from our findings in Table 2, data and charts (section 5), and summarized in Table 1. We may, however, consider Table 1 as the summary or deduction table of the specific calculations satisfying the following criteria:

1. Outside/inside risks are ranked according to probability rank R = 1, 2, 3, …, n, so if asteroids for outside influence is the biggest risk i.e. highly probable to occur or with a great P, and quite visible with a huge impact, then they will appear in the first line. This probability, however, is focused on priority (not of hidden or unknown risk type) as if saying, the most threatening version compared to others, is thus surveyed.
2. The 1-to-n probability from criterion #1 is deduced based on the percentile version or scientific notation of probability P, ranged between 0 and 1 for the degree of risk (Figure 1).
3. By definition, surveillance responds not to how to solve the problem, but how to detect it. According to this criterion, we detect the most risky one(s) within the domain of inside influence and outside influence classification, based on the gathered information and intelligence reports from across the

globe (e.g., reliable databases, research notes, demographics, documentaries and historical data).
4. We thus make changes relative to these influences based on the deduced P values on risk from the records stated in criterion # 3. The great P is built on a Population Mean of p's from section 4.1. Each p represents a specific event, a risk-builder as a contributor to a final risk with probability P, known as a trigger-point between one final P and another when concurrent P's come "visible" (section 1.2).

The current risk classification is organized by linking some of the risks to others, in terms of cataclysmic trigger points or contributors for a robust surveillance i.e., an interrelated inside and/or outside influence. This is shown in Table 1.

In some cases, e.g., row # 2 to 5, an inside influence risk (IIR) could also trigger a process (sequence of events) of an outside influence type as a cataclysm, quite relevant to the definition given of it as "something which sets off a sudden and violent change, or here triggers a process," (Solberg Søilen 2005, 80). This implies that the outside influence cause more outside influence events as denoted by the OIR predecessor (–) against OIR successor (+) trends in Table 1. The "predecessors" here, convey to the ontological identification or inherence of risks in p values, prior to just phrases or expressions of the IIR or OIR risks. Being of "pluralistic nature" (Gnoli 2008, 140), pluralizing all of the possibly visible risks, acknowledges the notion of trigger-points between risks, activating one after another. Based on criterion #4, this builds up the P as a summary impact or an average point $\bar{P}$, for all p's, thus:

$$\bar{P} = \frac{1}{n}\sum p = \frac{p_1 + p_2 + p_3 + \cdots + p_n}{n} \qquad (1)$$

This indicates the plurality of p's into the KOS as the result of the KOP, in conducting our SISAM functions. Those IIRs that have nothing to do with an OIR, shall remain limited to surveying budgetary reports on reducing human risks from the outside influence. In this case, row # 6 to 8.

The budgetary risk reduction costs per human, (avoiding extinction), is well-computed and hypothesized by Matheny (2007) using cost-effectiveness analysis. The present surveillance cost per human is derived in detecting all risks in much smaller proportions. A collective report of the specific risks in the analysis charts and tables (section 5), is to focus the incoming data from globally positioned real-time surveillance units, and via probability analysis techniques, publish the new SISAM results to the network (section 6).

5.0 Data and Charts

5.1 Disaster-related issues, potential variables, analysis and deductions

Concern level: Let the level of concern be high or 5 per disaster, and a gradual state leading to a disaster, scaled between 2 and 4. This disaster would read in terms of human life destruction relative to its level of concern. This could be, for example, a climate change dangerous concern (later shown as issue # 4 relative to CO_2 emissions, in Table 2). For instance, the Intergovernmental Panel on Climate Change (IPCC) Reasons for Concern as dangerous anthropogenic interference (DAI), is classed as a global impact (Figure 1). The DAI is explicitly measured by Mastrandrea and Schneider (2004), and reported as an organizational and structural concern attribute. This attribute denotes our survival rate which relies on the atmosphere, subsequent to the sustainability ratio changes we have made to the way we consume natural resources. From these measurements, one derives the probability based on the DAI graphs as well as other factors and hypotheses from reports indicating disaster-related issues gathered in Table 2. For example, melting glaciers develop other forces to spur quakes and volcanoes (NASA 2004, Carolina and Sigmundsson 2008), later known as issue # 4, triggering #2, in the same table.

Table 2 attributes and calculations: In Table 2, certain particulars are reaffirmed as issues experienced by humans on Earth, and a catastrophic version of it, either occurred way back before man, or centuries ago, or on the yet-to-happen basis. This is indicated by the "occurred event" column in Table 2. The issue is linked as a global type and/or with smaller scales to other issues, in the "Causes issue or the co-link-to column" in Table 2. For instance, based on our deductions from Carolina and Sigmundsson (2008), we conclude that, as # 4 frequently occurs to a rising scale, e.g., glaciers and icecaps melting on the planetary surface, the more likely is a seismic rise occurrence. The latter indicates a set of newcomer large-scale earthquakes, and eventually a trigger to a supervolcanic eruption. Other particulars like multiple large-scale hurricanes and tsunamis represented by # 7, could also be linked to # 4, which is directly linked to # 5 as the core of the current problem. So:

$$\text{if } \#\, 5.i \xrightarrow{yields} 4;\ \text{then } 4 \xrightarrow{yields} \{2,7\} \xrightarrow{yields} \{3,7\} \qquad (2)$$

Surveillance/ Risks	**Outside Influence**		**Inside Influence**	
	Risks	**Surveillance**	**Risks**	**Surveillance**
1	All the risks below with/without one another, collaborating in small or bigger groups	Detect via all methods below	All the risks below with/without one another, collaborating in small or bigger groups	Detect via all methods below
	Average $P \geq 0.28$	–	Average $P \geq 0.4$	–
2	Multiple-large scale natural disasters: *hurricanes, fires, Atlantic Tsunamis, earthquakes, acid rains, virus attacks, pandemic, etc.*	Metrological satellites, geological and seismic sensors, medical surveys, etc.	Human climate footprint (*current*)	Industrial BI reports, consumer-producer, ecological effects, biodiversity reports, etc.
	Average $P = 1.0$	OIR^- 4, 5, 6, 7 and/or 1 IIR^- 2-5, and/or 1	Average $P = 1.0$	OIR^+ 2 and/or 1
3	*Hostile extraterrestrials or a cosmological catastrophe (e.g., an ultimate space-time dimensional rip)*	Could happen anytime by altering space-time fabric; we refer to speculative reports, hypotheses, observatories or other means of current space and time technologies	Nuclear disaster footprint (*less concurrent*)	Frequent geopolitical, and real-time security reports, via surveillance, intelligence organizations, databases, etc.
	Average $P = 0.5$	OIR^+ 8 and/or 1	Average $P = 0.75$	OIR^+ 2 and/or 1
4	*Super-volcanoes*	Detect through geological sensors and current reports on surface + underground Earth activities	Synthetic biology (*less concurrent*)	Medical reports and current biotechnological hazardous developments, super bacteria, etc.
	Average $P = 0.00000082$	OIR^+ 2 and/or 1; OIR^- 2, 5 and/or 1	Average $P \geq 0.5$	OIR^+ 2
5	*Asteroids or deadly impact*	Detect through satellite before impact; non-compensable after impact relative to reduction risk reports like Matheny (2007), or migration to elsewhere, below surface or other planets	Physics experiments (*less concurrent*)	Energy physics reports, probability impact reports on subatomic strangelet possibilities (*strange matter*)
	Average $P = 0.00000002$	OIR^+ 4, and/or 2	Average $P = 0.08$	OIR^+ 1
6	*Sun's death or a nearby collapsing star (supernova)*	Detect through satellite telescopes; non- compensable on a global scale after death.	Machine Super Intelligence or AI (*N/A to current, or to be in a distant future*)	Currently unavailable or sci-fi material, but might be developed in the future as a new risk; academic research reports and patented inventions on paper
	Average $P \approx 0$	OIR^+ 1-5 and/or 8	Average $P \approx 0$	IIR^+ 1
7	*Anomalies between all the above and below risks, their correlation and time/order of occurrence!* $P > 0$		Psychological large-scale mass suicide/systematic or collective genocide (*current*)	Psychological profiles and cases of mass suicides via e.g., psychological warfare, media, religion, etc.
			Average $P = 0.0000277$	IIR^- 1 and/or OIR^- 1
8	*Other unknown outside risks*	Hidden	*Other unknown inside risks*	Hidden
	Average $P = 0.5$	–	Average $P = 0.5$	–

Table 1. An 8-by-8 summary surveillance table on risks as inside and outside influence, their trends and relationships

Legend:
OIR^+ = could result in one or more outside influence risk(s), respectively; IIR^+ is for inside influence risk.
OIR^- = could be triggered by certain outside influence risk(s), respectively; IIR^- is for inside influence risk.
P = probability

No.	Disaster-related issue	Causes issue	Global impact	Concern level	Impact probability	Occurred	Controlled
1	**Asteroid** *a.* size= 10-50m	0	0%	2	0.2	+	+
	b. 100m	0	1-to-1.66 %	3	0.001	+	–
	c. 1-2km	{2,3,4,7}	100%	4	0.00001	+	–
	d. 15km	{2,3,4,7}	∞	5	0.00000002	Δ	Δ
2	**Large-scale earthquakes** *a.* Average of 2.7 years (1968-1987)	0	0.01%	5	1	+	–
	b. Average of 2.4 years + hurricanes (1988-2005)	0	1%	5	1	+	–
	c. similar frequency with more coincidence 2005-1010	0	5%	5	1	+	–
	d. similar frequency with greater human population under effect (2010…)	0	5%$^+$	5	1	+	–
	e. So many earthquakes consecutively	{3,7}	∞	5	1	Δ	Δ
	f. So many earthquakes simultaneously	{3,7}	∞	5	1	Δ	Δ
3	**Super-volcano** *a.* Every 60,000 years	{4,7}	∞	5	0.0000014	+	–
	b. Yellowstone	{4,7}	∞	5	0.00000024	Δ	Δ
4	**Climate Change** *a.* 1960	{2, 7}	10%	4	1	+	–
	b. 1970	{2, 7}	25%	4	0.8	+	–
	c. 1980	{2, 7}	50%	5	0.3	Δ	Δ
	d. 1990	{2, 7}	75%	5	0.05	Δ	Δ
	e. 2000	{2.7}	90%	5	0.25	Δ	Δ
	f. 2005	{2, 7}	100%	5	0.1	Δ	Δ
5	**Human Footprint** *a.* 1975	{4,6,7}	100%	2	1	+	–
	b. 1985	{4,6,7}	110%	3	1	+	–
	c. 1995	{4,6,7}	124%	4	1	+	–
	d. 2000	{4,6,7}	129%	4	1	+	–
	e. 2005	{4,6,7}	145%	5	1	+	–
	f. 2008	{4,6,7}	151%	5	1	+	–
	g. 2012	{4,6,7}	175%	5	1	Δ	Δ
	h. 2014	{4,6,7}	200%	5	1	Δ	Δ
	i. 2014$^+$	{4,6,7}	∞	5	1	Δ	Δ
6	**Nuclear Disaster Footprint** *a.* Hiroshima and Nagasaki	0	1%	5	1	+	–
	b. Chernobyl =400 Hiroshima bombs	0	1%	5	1	+	–
	c. Global Nuclear War =30,000 warheads	{2,3,4}	∞	5	0.5	Δ	Δ
	d. Instant human annihilation = 1.24 million warheads	{2,3,4}	∞	5	0.5	Δ	Δ
7	**Other probabilities: Multiple large-scale** *hurricanes, fires, earthquakes, acid rains, pandemic, etc.*	0	∞	5	1	Δ	Δ
8	**Earth's collapse as a black hole** (*physics experiments*)	0	∞	5	0.08	–	Δ
9	**Sun's death or nearby supernovae or black hole**	{1-to-6, 8}	∞	5	0.5	–	Δ
10	**Cosmological impacts**	{1-to-6, 8, 9}	∞	5	0.5	–	Δ

Table 2. Disaster-related issues with probabilistic impacts, indexed in our real-time surveillance system

Legend:
(–) = No ; (+)= Yes ; Δ= Not yet or circumstantial ; ∞ = Infinite impact or a set of effects indicating a global catastrophe ; 0 = Yields no other issue or the consequent global impact is minute otherwise infinite

Note: The numbering (No.) is not based on risk priority like Table 1, since Table 1 is the deduction summary of the analysis made in Table 2. Therefore, the current table representation is of probability analysis leading to the classification of risks based on priority as well as acquisition of incoming information inherent to risks for the KOS.

whereby, establishing a set notation {2,7} and {3,7} as an inclusion factor between global events and their relative impacts becomes apparent. The excluded issue, however, is of remote or outside influence, and could lead to another after impact i.e. yielding events 4, 2, 3 and 7 after the asteroid 1.d surface hit respectively, or:

$$\text{if } 1.d \xrightarrow{yields} 4;\ \text{then } 4 \xrightarrow{yields} \{2,7\} \xrightarrow{yields} \{3,7\} \xrightarrow{yields} 4 \quad (3.a)$$

It is obvious that the latter gives a cyclic sum of impacts as the result of issue # 1.d. So, going back to case (2), a sequence sum of impacts mean gives:

$$\frac{1}{n}\sum P(\text{Impact}) = \frac{\infty + \infty + \infty + \infty + \{10\% + \cdots + 100\%\}}{10} = \infty \quad (3.b)$$

or uncontrollable or irreversible phenomena by man after a sequence of at least six event occurrences, one succeeding after another, such that the probability mean, in case (3), is derived by averaging the events as they chronologically occur in sequence, or:

$$\frac{1}{\max(i)}\sum_{i=1}^{\max(i)} P(\text{Impact}_i) = \frac{\{(1+1+1+1+1+1)+1\}}{7} + \frac{\{1+0.8+0.3+0.05+0.25+0.1\}}{6} + \frac{\{(0.0000014+0.00000024)+1\}}{3} = \frac{1+0.416667+0.333334}{3} = 0.583334 \quad (3.c)$$

Therefore, working out the remaining cases from the table, using the above impact-yield relationships (2) and (3), would depict the short and long term limits of a futurology concept (Solberg Søilen 2005) for the SISAM model. The impact mean $P = \infty$, is compliant with the "pre-empted existential calculations" based on P by Bostrom and Ćircović (2008, 122-123), when the Q variable as the probability of human extinction upon the catastrophic event approaches 0, giving $P = \infty$, such that (Bostrom and Ćircović 2008, 123):

> very destructive events completely destroy predictability! An obvious consequence is that absolutely destructive events, which humanity has no chance of surviving at all ($Q = 0$), completely annihilate our confidence in making predictions from past occurrences. This almost trivial conclusion is not, however, widely appreciated.

Despite an absolute annihilation from some probable risk, there remain yet other events that co-occur in real-time from the same risk. For instance, the notion of human survival sustainability on natural resources, relative to overconsumption impacts on the ecosystems, according to relations (2) and (3), is not only the most connected to other disaster-related issues, it has also room to be controlled in parallel to issue # 6 (a "doomsday scenario," Bostrom and Ćircović 2008) based on a similar scale. It is by all means "circumstantial" (Δ), in Table 2, at the point of infinity ∞, however, controllable before reaching that point, since both issues are conducted within manmade territories. According to Bostrom and Ćircović "taxonomy and organization" (2008, 2-4), the risk is categorized as "imperceptible" on the axis of its intensity, while "global" is placed on the axis of its scope (Bostrom and Ćircović 2008, 3). Therefore, the notion of controllability becomes feasible based on the p metric. The human footprint probability $P = 1$, shows that it is co-occurring with other hidden and visible risks with a potential global factor that grows and could trigger other risks in a possible future (co-occurrences of many global events).

Asteroids: The number of deaths in china was estimated to be 10,000 in 1490. During the founding of the Ming Dynasty (1368), the population estimate of that country approaching the 1400's was 60 million (Morabia 2009, 1363-1366). Therefore, the risk factor for the regional human population, generally is distributed to be 10,000 × 100% / 60 million = 1.66%, when this size of asteroid impact occurs after passing through the atmosphere. This estimate is supported solely with the assumption that the atmosphere is stable. In reality it is currently changing due to humans' ecological impacts, as discussed later. The other deduced statistics, mainly express disaster-related issues to be linked to the human footprint area as a "closely visible event," in Table 2.

Large-scale earthquakes: With reference to the findings of Grossi et al. (2008), we take the average of the large-size earthquake disasters coinciding with hurricanes between years 1988 and 2005, giving a recurrence frequency for every 2.4 years. Further comparisons with the previous frequency, displays a trend for every 2.7 years, excluding the main hurricanes, between years 1968 and 1987. It shows that the recurrence frequency is more coincidental with other potential disasters within the period 1988-2005. Thus, other potentials could trigger off multiple-scale earthquakes with other disasters across the globe in the near future. This has been indicated via issues # 3 and 7, or subset {3, 7} in Table 2.

Super-volcanoes: Despite the level of concern being the highest for this disaster, its probability impact for the Yellowstone case is quite low compared to other issues. "The term 'supervolcano' implies an eruption of magnitude 8 on the Volcano Explosivity Index, meaning that more than 1,000 cubic kilometers (240 cubic miles) of magma (partially molten rock) are erupted. The most recent such event on Earth occurred 74,000 years ago at the Toba Caldera in Sumatra, Indonesia" (Lowenstern 2008, Yellowstone Volcano Observatory: our probabilities reflected in Table 2 are derived from the same observatory). While being quite visible, its occurrence is a matter of time which is hidden and difficult to predict. Based on historical accounts, it will happen but when is still unknown or Δ (Table 2 right columns) for this variable, and in turn, once occurred could cause issue # 4, or triggering other possibilities like # 6 and 7. This risk is significant and after impact delivers a global cooling of 3-5°C for several years and regional cooling of up to 15°C. However, prediction strategists find it difficult to calculate the actual impact and rely on incoming flow of massive amounts of data and observations to make estimates (Bostrom and Ćircović 2008, Chapter 10).

Human climate footprint: According to Ewing et al. (2010, 12), "in 1961, the first year for which the National Footprint Accounts are available, humanity's Ecological Footprint was approximately half of what the biosphere could supply—humanity was living off the planet's annual ecological interest, not drawing down its principal (Figure 2). According to the 'national footprint accounts,' human demand first exceeded the planet's biocapacity in mid 1970s. Since 1961, overall humanity's Footprint has more than doubled and overshoot has continued to increase, reaching 51% in 2007. The various land use types are stacked to show the total Ecological Footprint (Figure 2). Humanity's Ecological Footprint in 2007 consisted of 22% cropland, 8% grazing land, 11% forest land, 4% fishing ground, 54% carbon uptake land, and 2% built-up land. As these annual deficits accrue into an ever larger ecological debt, ecological reserves are depleting, and wastes such as CO_2 emissions are accumulating in the biosphere and atmosphere." The cumulative growth of the footprint is visible in issue # 4 through 5, Table 2, which reflects Figure 2 accounts on the growth with respect to world's biocapacity i.e. 1.5 Earths. Therefore, relative to this overconsumption growth, the level of concern escalates, as well as probability impact (or less uncertainty in our surveillance), quite visible in issue # 5.

Nuclear disasters: Regardless of the nuclear disasters experienced back in WWII, and Chernobyl in 1986, the range of environmental impacts has been limited to certain geographical regions or specifically, in terms of exclusion zones (Ivanov et al., 2009). Meaning that, the spread of an environmental global impact presumably is 1% and does not indicate the destruction of the whole planet. Nevertheless, having said this, a strong chance for a catastrophe destroying all mankind can be calculated if we would have had 1.24 million warheads of any size and strength, launched and impacted simultaneously (issue # 6.d). On that scale, there will be no chance of survival for the human race. The probability of that occurring, or "co-links" to "nuclear terrorism" is computable based on the 50% chance of Nation States to launch, or a 0.5 probability (Bostrom and Ćircović 2008, 383). With the current available number of warheads = 30,000 (Borger 2011), from a declining average of 10,277, we deduce a 0.8~1% probability for a total annihilation (issues 6.a, b summoned to c). The as-

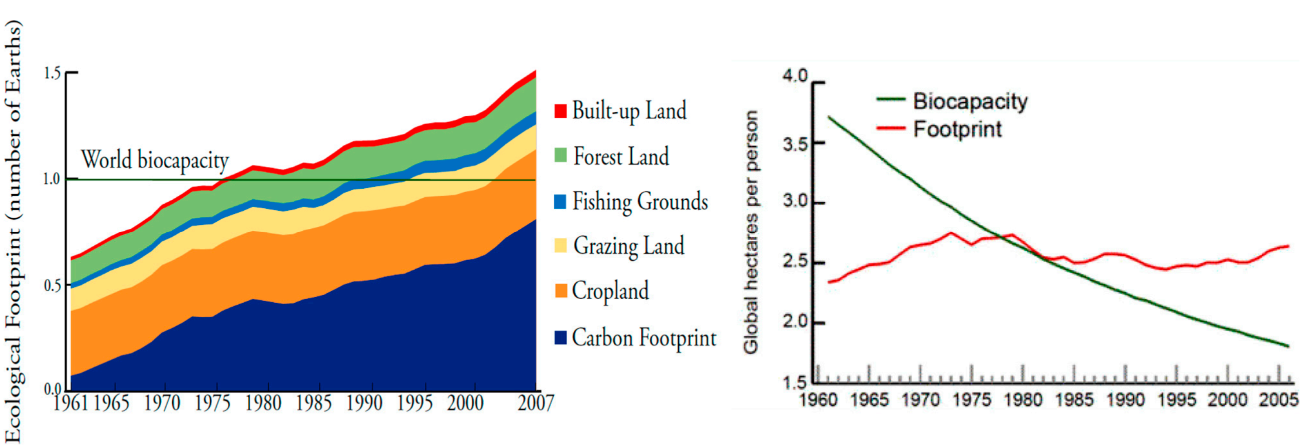

Figure 2. Information summary from Ewing et al. (world overshoot according to the National Footprint Accounts 2010) human footprint research, as a sample input or part of historical records, is used for real-time data comparisons in the knowledge base surveillance system (Figure 3).

sumption is based on the entire 100% nuclear impact potential (issue 6.c or 6.d), and after impact the environmental consequences at a global scale exposing the rest of the human population to an unavoidable and uncontrollable radiation. This biodiversity effect attribute among other species is speculative when it comes to statistics for the planet, and thus, for now, based on present knowledge, is better limited to certain critical zones where a negative trend in mankind's nature can be imagined, and actually reoccurs from time-to-time. The biodiversity issue by Bostrom and Ćircović, (2008, 3) is classed endurable on a trans-generational scope inclined to a subset of terminal human extension on the axis of its intensity, an existential risk.

Mass suicides/genocide: A number of individuals will commit mass suicide and/or systematic genocides. The average probability $\bar{P}$ could increase based on reporting the p's of one or more groups (subsets) of risks in a surveillance system, which escalates the believability or psychological instability process in a human being. Therefore, a global or large scale collective suicide/genocide could occur as a risk leading to human extinction:

(1000 feared people or believers × 194 countries) / 7 billion people = $2.77142857 \times 10^{-5}$

This, by itself, gives a P = 0.0000277: a summary of findings of the risks in Table 1 as an overall scope of Table 2, i.e. "fear from all the issues" # 1-10 triggers off this risk, hypothetically speaking. Small scale examples are given in factual reports like the Jonestown massacre in Guyana, and elsewhere (Smith 1982). Similar events as a partial list of examples might include the Nazi genocide, suicidal missions carried out by Japanese Kamikazes in WWII, and currently, religious or ideological extremism as suicide bombers, triggered by broadcasts in different ways by mass media or the internet.

Other possibilities: These possibilities are roughly stated in Table 2, issue # 7-10. They map probable scenarios as risks with large-scale impacts i.e. global or even existential (Figure 1). Escalating instances are shown in a documentary program by Sjöström et al. (2010), whereby the specifics of the issue is expanded in issues # 8-10, increasing the depth of concern level as well as uncertainty (the color spectrum varying from grey to black). Risk # 7, however, is a matter of recurrence of events and could well be triggered by certain predecessors as higher keys from the ontological tree, resulting in the same risk class, or lower keys as p's from Equation (1). Each class is classified as a set of issues from low to high levels of concern, and specified via the "cause issue" and "disaster-related issue" columns in Table 2. This further structures the model with specific variables mainly as outside influences which could trigger off other issues in catastrophic scenarios. For example, supernovae, black holes and cosmological impacts denoting a huge transformation of our physical world to something else are classed as a strong possibility by e.g., alien experimentations, natural changes of space and time relative to matter-energy states across the universe (cosmos).

6.0 Related studies with existential risk classification compared to SISAM classification

For surveillance purposes with cost-effective analyses for each type of risk per human, our classification differ from other classifications which are made as visible risks by e.g., putting physics experiments, climate catastrophe, doomsday war, machine super-intelligence, biological or synthetic weapons as inside influence risk # 5, 4, 2, and 1, respectively (Sjöström et al. 2010, Bostrom and Ćircović 2008). In contrast, the current classification is made specifically to detect the relatedness and cataclysmic trigger points with their probability order of occurrence, where co-relation between factors is tangibly visible. According to the four SISAM criteria (section 4), the risks are not solely classified as being the biggest risk in scale or impact: the risk is mainly classified by two factors, being large and most likely to occur along a dimension of time or immediacy.

In other words, the current risk classification differs from other presentations, based on two main criteria: 1- the risk we are classifying is most likely to occur/recur shortly i.e. highly probable, tangible and currently visible, and 2- the remaining risks shall be less concurrent despite of their large scale impact i.e., they have never occurred or might occur with the least probability. So, statistically, the emphasis is on how to detect the most likely risk in order of occurrence, with respect to how large the impact and its association with other risks.

Fear of some risks happening, like the mass suicide case, trigger other risks in parallel, putting them in a sequence as a group, each leading to another in the SISAM classification. This gives us a strong projection for being aware of certain current risks that do exist but does not indicate an imminent or instantaneous existential human extinction. The focus is on the main current risks that frequently occur as a strong indication of an already researched and established trend towards human extinction. Yet, hidden risks like # 10 for both IIR and OIR columns remain, and could happen with no preamble to another event.

6.1 *SISAM classification and visualization in the knowledge organization*

In continuation, the following section shows how these risks are mathematically identified, and through analysis, classified and co-related one to the other to reach a verdict on the order of degree of risks (which one is the biggest risk in size and probability? Recall Figure 1). Therefore, the surveillance component is deduced in our table as the system detects one problem prior to another. In addition, the compensative surveillance cost is calculated on each risk in US dollar per human, (or, how much would it take to survey each risk per person?). According to Matheny (2007), we base our surveillance cost on $1 per human for a particular risk, and $2.5⁺ for compensative means per year. The rationale to this is that the SISAM classification focuses on how to practically survey multiple risks like e.g., a large asteroid impact, which estimates that "the cost of asteroid detection and deflection is assumed to be $20 billion, paid in the present" (Matheny 2007, 1341), whilst relative to other co-occurring risks with an \$$x$ factor impact. In other words, $k \times$ \$20 billion + \$$x$ to survey all risks based on the incoming flow of information (a real-time dataset). The k number converges to the interval of current risks to the population. In this case, $k = 8$ to more risks (Table 1), giving an estimate of \$160 billion dollars excluding the extra \$$x$. This avoidance of \$$x$ cost in our survey, is solely possible when we consider a simulation program installed on the surveillance system. This program must be able to calculate all probabilities coupled with historical records of the co-occurring risks, as well as trigger points starting others.

To do so, the system must access, process and maintain this information according to Figure 3. The database component should contain samples (like Figure 2) as well as real-time updates which form the future curve of the sample in its priori distribution: growing negative otherwise positive trend which form our predictions (see prediction algorithm, Bostrom and Ćircović 2008, 125). Thus, a predictable pattern is generated to its antecedent data points on the same curve.

The incoming data from different geographical locations, observatories, central servers, etc., relevant to classified indices over probable risks are compared to one another via program code. This code, as the surveillance code, is presented in form of a Visual Basic Script (VBS) to process data, thereby indexing it as information into a database table (rows by columns). The choice of VBS is well-defined for simulation purposes and its effective analysis delivered from databases via its modules.

The table values, generated by the VBS in the DB indices, represent probability results. Then, using a simulation program like MATLAB, priori distribution curves are generated as well as visualization of data representing surveillance results. The active script is programmed in VB as an automation technique to produce p's, once real-time data and records are compared with to acquire and process information. This comparison is conducted by decision support system (DSS) agents (Turban et al. 2007, 637-653) in the program.

The produced p's are linked relevant to our surveillance model like the 8-by-8 matrix resulting a curve akin to Figure 4. Each p is stored and positioned in its column, in one of the 8 rows for a specific risk as well as its rank R (Table 1), denoting where the IIR/OIR is likely to occur, in real-time. The geographical loci of p's on the map are the x, y and z coordinates, as they frequently get updated when the system accesses organizations data network (or central servers). There will be two tables in total, one for IIRs and the other for OIRs and the rows of p could be further indexed to satisfy certain risks in the given rank.

For example, on a set of geographical locations (or a loci of points on Earth's plane i.e. map), the format {1, 0.5, 0.3, 1, 1} stored/updated in row # 4 of the database, denotes that $p_1 = 1$ is happening in a particular place, and another location is experiencing $p_2 = 0.5$, so forth. Therefore, using Equation (1), computing the average P based on rank # 4 (supervolcanoes) gives, $\bar{P} = 0.76$.

After DSS agent comparisons, simulating a scenario for a major P (computable by Equation 1) is plausible at the visualization phase from the resultant curves with extrapolated data. The DSS agent further pinpoints which parts of the planet are most likely to receive the impact from the specific surveillance based on the 3D xyz coordinates. An example of a 3D geographical map points on a sphere, representing planet Earth, is illustrated in Figure 3 for the 8-by-8 risks matrix. For each specific risk in the plurality of p's from Equation (1), tagged on the map, could be

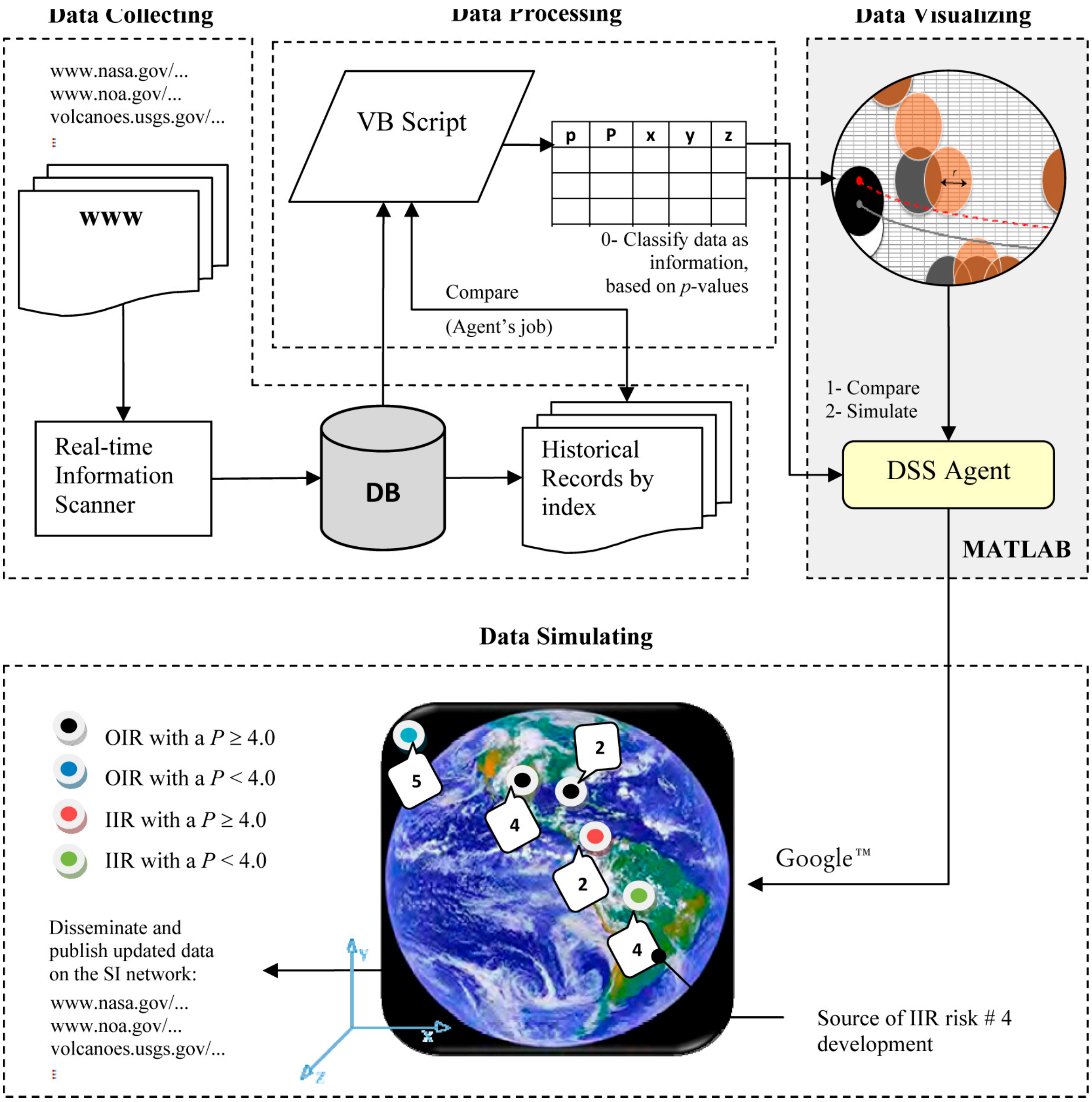

Figure 3. This is a proposal to the SISAM surveillance system, incorporating a simulation program after development, for detecting multiple influences, major risks, in real-time. This program is an advancement of Osińska and Bala's experiment architecture (2010, 163), with additions of relevant surveillance functions. All functions are performed by software components, and begin with accessing data from a set of network domains or www's, or other forms of IP addresses. These domains supply the program with kernel resources (data collecting) such as real-time private and public surveillance websites to produce intelligence. This intelligence is acquired by processing data via database components and a program script. From there, data is compared with current information as well as historical, archived in the system. These comparisons are made by a DSS agent residing in the system which further visualizes data once indexed in form of p values. Relative to where the p is most likely to occur on the planet (the x, y, z coordinates), the total P is pinpointed for a specific risk on the global map and reported back to the necessary organization operating on the globe. From there a State Intelligence (SI) decision point is made based on the simulation results.

visualized into Google™ Earth viewpoints with zoom-in and out options. Google™ Earth, is a virtual globe, map and geographical information tool, and is importable as a plug-in to our simulation program. Therefore, the specific results for a particular p on a micro scale, its population mean, building a major P on a macro scale (see criterion #4, section 4) could be displayed like the Google™ Earth virtual environment. From a macro perspective (quite zoomed out), in the SISAM program, IIR and OIR tags denoting a

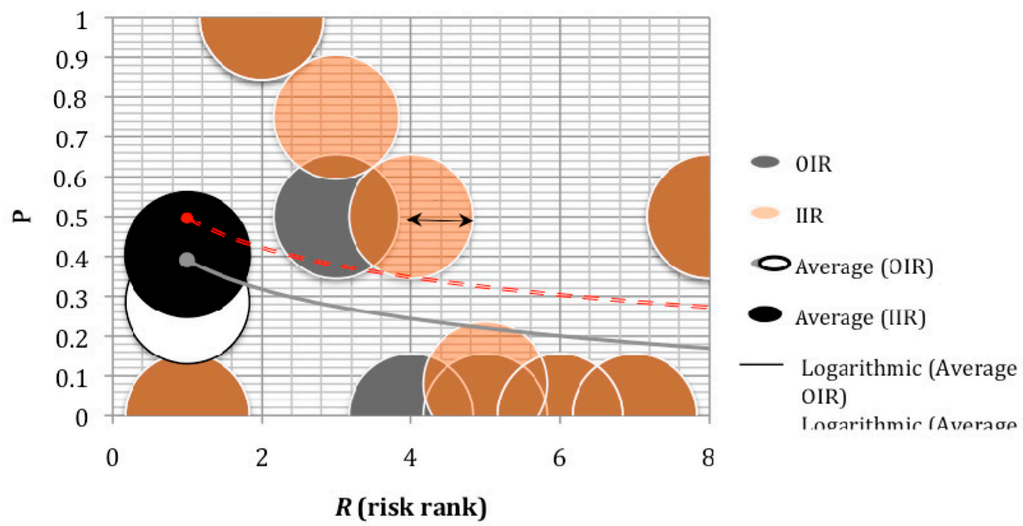

Figure 4. The surveillance model incorporated in a probable simulation program (real-time) is to detect the mostly-linked potential risk as well as other risk associated. The extrapolated data indicates a future outcome (average curves) as well as visibility, which at the most is detected between $0.4 < P \leq 1$, and at the least when $P = 0$.

computed P, are thereby displayed according to Figure 3. A good example of a specific risk, 'nuclear radiation', is presented by indicating the spread and exposure of it in the recent Tsunami that hit Japan (RDTN.ORG 2011). Any readings coming from the risk(s) could also be submitted to such organizational websites using automated HTML codes in the active script. Furthermore, the possibility of creating custom maps based on the SISAM model for final risk products (P's) is evident in terms of environmental conservation, disaster response, socio-political issues, wildlife, etc. (Google Earth Outreach 2011), relative to risks (p's). The implementation of lines of code in the SISAM program, explicitly include 'what-if' and 'if-then-else' statements representing issues like those incoming p's sampled by Cases (2) and (3) for a major P impact from section 5.1.

7.0 The mostly-linked potential factor

7.1 Which is the most effective issue from the negative trends based on our surveillance?

The following chart illustrates our deductive 8-by-8 relational statistics, a matrix denoting the association of ranks and probability estimates from Table 1, which are relevant to SISAM risk classification criteria (section 1), and analysis (section 5). It maps the spherical points of incoming data (Figure 3) to classify P between 0-to-1 from the main program outputs, delivering Figure 4 surface points on the sphere (globe).

In Figure 4, we plotted the values from Table 1, the average P (or $\bar{P}$) based on inside influence, IIR, is greater than the average P from outside influence, OIR. Furthermore, the extrapolated probability rank value (risk rank or R of the matrix) as new data plotted into the scope of OIR and IIR cause-and-effect relationships, could resize in surveillance output as one changes the input accordingly. Each rank variable could extend/retract between its incremental/decrement range in terms of $R = R \pm 1$, thus concentrating each P value as well as the surrounding values of an R in our surveillance outputs, their radius r of impact in triggering other R's expectably. For example, if rank $R = 1$ with probability $P = 1$, then the odds for other descending ranks of 2 and 3 are between probability 0 and 1. Therefore, if $R = 2$, crosses with probability less than 1 and greater than 0, hence, for the other descending ranks of 3 and 4, P would land between 0 and 0.85, and so forth. Hence, forming the linear trends upon the average P of all OIR and IIR risks becomes evident. In other words, while all risks are equally important to one's survival plan (ethically speaking), the less value in probability of occurrence the less the rank becomes vital in our surveillance analysis.

Mathematically, for all the summarized risks in Table 1, there exists a possible combination of risks occurring in real-time in the surveillance system, from 1 to more, in population between the IIR and OIR tables (Figure 3). Let this population be identified as i for OIR, and j for IIR, giving a possible combinations product

$$R_{8\times 8} = \{R_{\mathrm{OIR}} | R_{\mathrm{IIR}}\} = \prod_{\substack{i=1\\j=1}}^{8} (i|j) = (1\times 2\times 3\times \ldots 8)_{\text{table 1}} (1\times 2\times 3\times \ldots 8)_{\text{table 2}} = 1\times 2\times 3\times \ldots \times 16$$
$$= 20{,}922{,}789{,}888{,}000 \quad (4)$$

or 20.92 trillion risk combinations. Thus, given the number of elements $P = \{P_1, P_2, P_3, \ldots, P_n\}$, or $P_{\mathrm{population}}$, the maximum cardinality of P (or $|P|$) is 20.92 trillion risks across the globe, and its minimum is 1 concurring risk, or:

$$\forall P_{\mathrm{population}} \in \{\mathrm{OIR}, \mathrm{IIR}\};\ 0 < |P| \leq 20.92 \text{ trillion} \quad (5)$$

The P population pinpointed on the map is computed by the surveillance system real-time, or 20.92 trillion computations per second. So, a personal supercomputer like Cystorm (Science Daily 2009), a Sun Microsystems® machine, would be suitable to handle the simulation's data intensive surveillance, since it is capable of performing 28.16 trillion computations per second, which is greater than the expected SISAM's 20.92 trillion P population per second.

In general, based on present data, we have calculated the IIR probability as well as OIR probability by averaging the other elicited average P's (risk # 2, 3, …, 8), by summing risk # 2 to 8, and dividing its result by 7, giving $P = 0.4$ for IIR # 1, against $P = 0.28$ for OIR # 1, in Table 1. So, we hypothesize that:

> **Hypothesis 1.** A major inside risk is the most probable to occur compared to any outside influence potential risk.

This result changes by strengthening vs. weakening P's denoting large scale global activities when the SISAM system operates 24/7. From our findings, one could recognize the potential factors as surveyed, that is which variable is the most linked or connected causing a disaster. The most visibly-controllable variable is risk # 2 from inside influence with its co-relation to outside influence # 2, indicating multiple-large scale natural disasters through pre-emptive means. Other IIRs 2, 3, 4, also have co-relationships, but are not as probable as the latter. The OIR # 2 is highly probable or $P = 1.0$, and thus quite visible within the context of OIR with probability $P = 0.28$. Its co-potential relation of inside influence, $P = 1.0$ within the context of IIR with probability $P = 0.4$ makes it a very strong trigger point (contributor), more visible in our probability analysis. In other words:

> **Hypothesis 2.** A major co-related visible influence is of inside type with a high $P = 1.0$, in turn, triggering a parallel outside influence with a high $P = 1.0$, not acting autonomously, once an inside trigger point is initiated.

The most linked factor also constitutes our surveillance graph, the trend connector between risk factors (the dotted line), based on the summary table, Table 1, indicating which risk factor is the highest with respect to time compared to other factors measured in percent.

7.2 Using a refined BI model for detecting the intensively linked variable

Table 1 reaffirms the deductive findings stated in our data and charts (section 5) in one particular area, mainly upon the controllable issues at hand with a high probability of occurrence. The comprehensive version of our claim on the ecology variable is visibly affected as the most connected risk to other concurrently-detected risks in our estimates. This risk is still possible to control after detection despite of its potential negative effects upon other issues. The remaining negative trends are detected by our surveillance system, where SI decisions are made in cases where infinite effects would be encountered (denoted by a '∞' symbol in our tables). The human footprint generalization provided us the most connected risk as an inside influence and to some extent, a trigger to others, and sometimes as the main contributor to outside influence on the surface, in this case a set of large-scale natural disasters. This resembles the controlled systematic protocols of a global nuclear war impact.

8.0 Future research

Our model is used to detect and predict future events for an intelligent decision. We can expand our findings to visualize real-time risks of up to 20.92 trillion updates on risks according to Equation 4, and 5, in form of an experimental simulation, proving the validity of risks to KO. This delivers a more focused representation of the fragmented (discrete) ways of surveyed data on the network from different organizations that report their surveillance findings in space, beneath and above the surface of the planet, in real-time. The adaptation of Osińska and Bala (2010, 159-167) to our SISAM diagrams, is relevant for any 'scientific field', which promotes current visualization processes to real-time tangible scenarios on the visibility factor of the risks. The taxonomy of our classification could simply be mapped to their KO models as well as surveillance updates on the network, once IIRs and OIRs are recorded.

9.0 Conclusion

In this paper, we have introduced possible co-relationship of risks in terms of information resource taxonomy based on global catastrophes. The value of such studies has been shown relevant once again due to the recent earthquake in Japan which triggered a tsunami, which again triggered an incident at a nuclear reactor. The aim of the index classification, thereby making the right decision in some organization, was to detect one—visible and high-***P*** issue—amongst other probable issues (mostly hidden or with low-***P***). For example, to mitigate a low-***P*** becoming a future high-***P*** threat, in the SISAM survey on the climate change risk, gradual replacements of all fossil fuels with green fuels, without losing profit between the production and consumption lines, normalizes the IIR and OIR classification outcomes (making their relationships less complicated). This of course, is beyond the scope of the current paper. However, to attain this level of management insight, the merging of smaller decisions at a micro level must occur first, to attain a focused decision-making system on the basis of such surveillance methods. The SISAM contribution improves current business organizational practices, avoiding prioritized risks (Definition 1) as specified in Table 1.

The SISAM system is classified to study IIR and OIR's, by comparing its classification system to other classifications presented in KO studies. Our findings were reflected in a collective sense, in proposing a simulation program to survey the major risks to our planet as studied by Nation States, which enabled a focused prediction between risks. Although knowing that the exact calculations remain an impossibility, we believe to have come a bit further towards in showing how the problem can be handled.

In future studies the aim should be to use the current surveillance model and design for detecting any potential large scale global event, as they occur concurrently and quite closely in our prediction system. Finally, experimental simulation transacting data with real-time network domains, active in space, like satellites, beneath and above the surface, would provide further information for a focused intelligent decision in the SISAM system, addressing issues concerning information resource management, detection and organization of risks.

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