META SECURITY IN THE HUMAN HIVE: INTEGRALLY ALIGNING SUSTAINABILITY RESPONSES TO TRAJECTORY OF EVOLUTIONARY THREATS

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ABSTRACT

This article explores a meta-theory for Global Environmental Change and Human Security (GECHS) as it relates to the human hive. It explores the Integral City Framework for environmental change in the Cosmosphere, Biosphere and Anthroposphere. Four maps reveal how humans in the city impact global environment, and how human security is tightly bound with global and human evolution. Elements of the maps include subjective/intersubjective and objective/interobjective perspectives; nested holarchies of whole systems; fractal development of holons and social holons; and eight levels of complex structures. A specific example of the city of Abbotsford is used to illustrate an integral approach to GECHS. The article concludes that the integral city meta-framework provides a GECHS approach that is fractal, scaleable, global, local, holistic, comprehensive, pluralistic, interconnected, evolutionary and developmental.

Keywords: meta security, evolutionary sustainability, integral city, human hive, global, environmental change, human security

WHAT IS GLOBAL ENVIRONMENTAL CHANGE?

Authors in the Global Environmental Change and Human Security (GECHS) community make strong calls for a new GECHS theory that could transcend and include the valuable but partial views in use today. They seek a full spectrum, holistic, comprehensive, scalable systems approach (including social and biophysical elements) that integrates multiple sustainability paths and short, medium and long-term strategies (Buhaug & al, in press; Marcotullio & Solecki, in press; Simon & Leck, in press). This article suggests that an evolutionary, integral systems-based meta-theory might resolve fragmentary, reductionistic and misaligned views of GECHS and situate its discourse as it applies to cities, globally, trans-culturally, locally and evolutionarily.

AN EVOLUTIONARY META-FRAMEWORK FOR EVOLUTIONARY CHANGE

GLOBAL ENVIRONMENT AS THE COSMOSPHERE AND BIOSPHERE

Eddy (2003) reframed the study of geography as a history of the universe and world, within an integral model and ecosystem science. He provides an evolutionary view within which to examine both global environmental change (GEC) and theories of human security (HS). Eddy (2005) starts with the Big Bang and reveals the evolutionary strata that culminate inhuman civilization as in Figure 1.

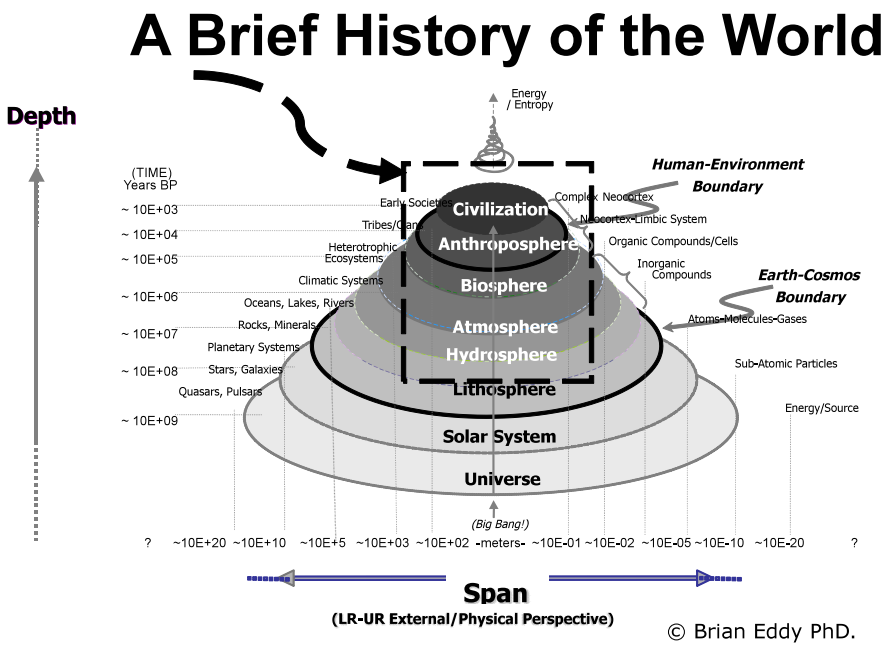

Figure 1: Brief History of the Universe and World. Source: Eddy, 2005

Eddy grounds the study of GEC within three discourses: the Cosmosphere that spans the universe; the Biosphere that includes the living global environment; and the Anthroposphere that embraces the human condition. He groups the study of these into a spectrum of "pure and applied sciences" as set out in Table 1.

Table 1: The ABC of Integral Geography (adapted from Eddy, 2005)

Science Cluster	Sciences	Relevant Geographic Spheres
Earth and Planetary Sciences:	Math, Physics, Chemistry Astronomy Geology Hydrology Meteorology etc.	**Cosmosphere :** Universe Earth Matter
Life Sciences	Biology Microbiology Zoology Botany etc.	**Biosphere :** Life Environment
Social Sciences	Psychology Sociology Anthropology etc.	**Anthroposphere :** Human Individual Collective

Eddy's evolutionary framework builds on Wilber's framing of holons and holarchies (Wilber, 1995, 1996, 2000, 2007) examining three differentiated strata: the Cosmosphere, the Biosphere, and the Anthroposphere (CBA or ABC). Thus Eddy's map effectively integrates the human condition as global environmental change (GEC), showing the three spheres as evolving one from the other and massively entangled at all scales and times.

GEC isues have been documented by many, frequently recognizing the interconnection of core threats. The Millennium Development Goals (anon, 2000) identified eight threats and the Millennium Project identified fifteen (Glenn, Gordon, & Florescu, 2011a, 2011b). Recently in the Integral City 2.0 Online Conference, five major threats to human populations in cities were identified as critical (Hamilton & etal, 2013; Hamilton & Sanders, 2013). However, those taxonomies are not analyzed within an integrated evolutionary frame. More recently, Hamilton (2011) integrated GEC issues within an evolutionary analysis to identify the strata critical to global wellbeing:

- Psycho-Cultural-Social (Diamond, 2005; Hamilton, 2008; Wilber, 1995; Wright, 2004)

- Bio-Genetic-Ecological (Esbjörn-Hargens & Zimmerman, 2009; Hamilton, 2008; M. E. Zimmerman, 2005)
- Food Scarcity (L. Brown, 2008; McKibben, 2007, 2011; Taylor, 2008)
- Climate (Adger, Aggarwal, Argawala, Alcamo, & etal, 2007; Diamond, 2005; McKibben, 2011; M. Zimmerman, 2010)
- Water (L. Brown, 2008; Diamond, 2005; Linton, 2010)
- Energy (Monbiot & Prescott, 2007)

Taylor (Taylor, 2008) elegantly maps the evolutionary incursion of human activity on Earth's natural capital, embraced by the B and C spheres. But the evolutionary connections to the B and C spheres that underpin our security (and sustainbility) dilemmas only effectively emerge when they are situated on Eddy's vertical History of the World Map as in Figure 2. Figure 2 makes the direct linkages, of Energy threats to degradation of the Lithosphere; Water threats to degradation of the Hydrosphere; Climate threats to degradation of the Atmosphere; Food threats to degradation of the Biosphere; and Psycho-Cultural-Social threats to degradation of the Anthroposphere.

Finally we can see that GEC is not just horizontally observable and quantifiable, but undoubtedly has deep interdependent evolutionary roots which we humans are ignoring at the cost of HS. Hamilton's application of Eddy's map integrates the threats of GEC with the issues of HS. Because the most evolved strata of this Threat Map is human civilization, which is now predominately located in cities (anon, 2011b, 2011c; Glenn, et al., 2011a; Taylor, 2008) this evolutionarily aligned Threat Map provides a meta-theory to explain the concurrency of influences embedded in GECHS. Next let's examine the meta-theory of the Integral City model (Beck & Cowan, 1996; Hamilton, 2008; Wilber, 1995), so that we can propose an evolutionarily aligned strategy for addressing the threats.

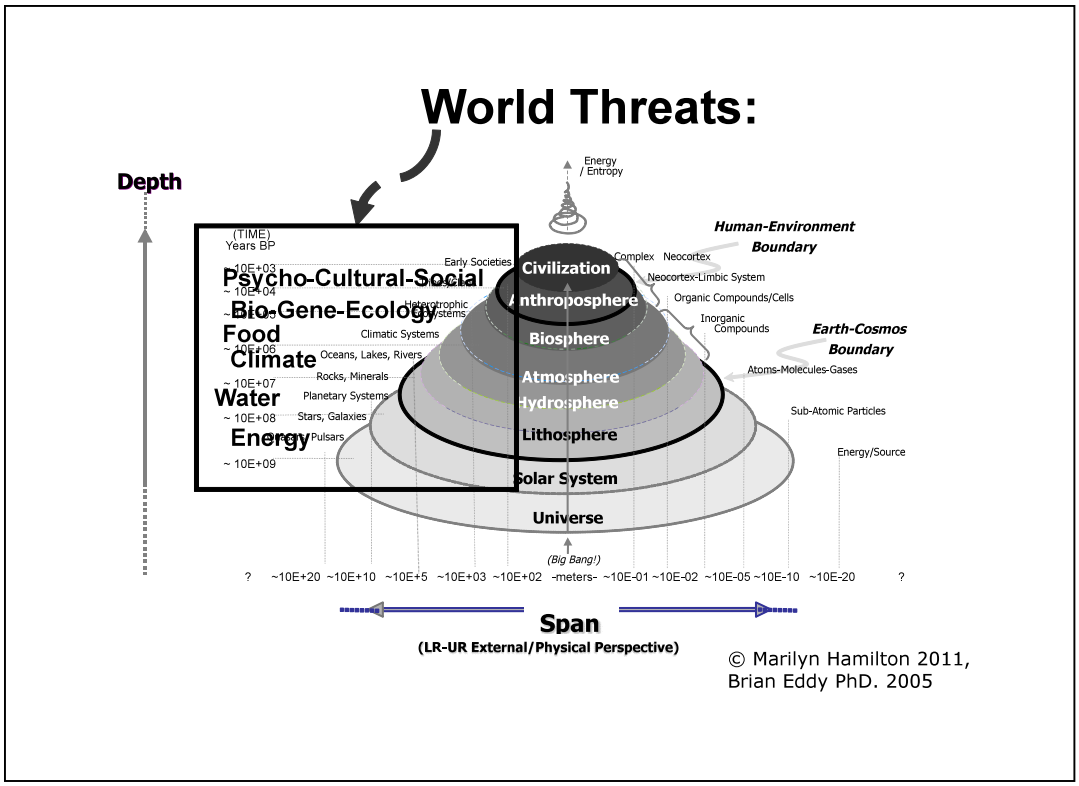

Figure 2: Threats to World Spheres in Evolutionary Trajectory

Global Environment as the Anthroposphere: 4 Maps that Reveal Humans as GE in the City

The Anthroposphere can be appreciated through a meta-theory that integrates four essential maps of the most concentrated human system – the city (Hamilton, 2008). Each map gives us a different view of human life (and thus HS as defined below) in the whole city (and eco-region) and helps us to understand the interrelationship of individuals, groups, sectors and communities. Although each map offers only a partial perspective, together they can be conceptually (and technologically) hyperlinked to give a more comprehensive picture of the "human hive" as interconnected, fractal, holographic and alive. A brief description of each map follows (with illustrations in Appendix A).

Map 1: The City as Holon – The Four Quadrant, Eight Level Map

This map shows how civilization in the city arises from both an individual/collective and interior/exterior expression (Wilber, 1995). The intersection of these two polarities reveals four city realities that we can label as:

1. Upper Left (UL): individual—beliefs
interior/ internal/ subjective/intangible
2. Lower Left (LL): collective—culture
interior/internal/ intersubjective/intangible
3. Upper Right (UR): individual—actions
exterior/ external/ objective/tangible
4. Lower Right (LR): collective—systems
exterior/ external/ interobjective/tangible

A reframe of Eddy's Table 1, in Table 2 shows how institutions of higher learning have organized the domains of knowledge through unique perspectives in each of these four quadrants common to all languages (I, We, It and Its) (Wilber, 1995, 2006; M. E. Zimmerman, 2005).

Table 2: Domains of Knowledge and Related Perspectives

Upper Left (UL) aesthetics and fine arts (I)
Lower Left (LL) humanities (We)
Upper Right (UR) life sciences (It)
Lower Right (LR) systems sciences (Its)

Map 1 is analogous to a "plan view" of human life and provides the coordinates for what Wilber calls "Kosmic addresses" (Wilber, 2006).

The value of Map 1 to seeing HS in the city is that it situates not only perspectives but methodologies (that are designed using integral methodological pluralism (Wilber, 2006)) for seeing the city as a whole living system (Wilber, 2006). It locates the parts, partial views and fragments of the city so that they can inform one another. By viewing the quadrants as an integrated city system we can see, for instance how the LL cultural values can be linked to the LR systems of safety, family law and recreational facilities, as well as individual UL beliefs and UR actions. Map 1 has a series of "growth rings" that spiral out from the centre along the diagonal axis of each quadrant, representing the eight stages of complexity discussed in Map 4.

Map 2: The Nested Holarchy of City Systems

The city as a human system is a nest of systems made up of centers (Alexander, 2004), holons (Koestler) or nested holons (Sahtouris, 1999). The systems have orders of complexity, so that the holons, wholes and centers are nested into holarchies (Wilber, 1996c) or panarchies (Gunderson & Holling, 2002) where levels of complexity (and scale) emerge over time.

The value of Map 2 to HS in the city is that it reveals that every individual is a member of multiple city sub-systems or sectors (eg. family, workplace, education system(s), healthcare system(s), place(s) of worship, neighborhood, city hall, and environment). Connections amongst individuals and sub-systems create spheres of influence, networks, communities of practice and meshworks as they become densified and aligned (Hamilton, 2010b). This map also reveals the progression of expanded time and space dimensions that correlates with larger and larger holons.

Map 3: The Scalar Fractal Relationship of Micro, Meso and Macro Social Holons

Map 3 shows the city as a social holon. A social holon is any group of people. Its qualities are not summative but dynamic capacities that come from the unique contributions of each individual holon in the social grouping. Map 3 conveys how capacity development in an individual contributes to capacity in all the holons of Map 2, while also revealing the reality of capacity dilution and amplification in the social holons of groups, organizations and communities.

As a natural system, the dynamics of social holons are expressed by the algorithms of fractal geometry — the elegant, patterns that result from the repetition of simple rules of relationship, that apply at multiple levels of scale. West (2011) proposes that such non-linear mathematics can predict factors affecting HS like people behaviour (eg. criminal actions) and infrastructure (eg. size of police force).

It appears that at every level of scale, fractal patterns of human systems reveal that city wellbeing (vibrant or dis-eased) is deeply intertwined in the patterns or principles that contribute to the wellbeing of individual holons and the social holons to which they belong as noted in Map 2.

Map 3 reveals that HS in the city is dynamic, arising from the tension between levels of development in collectives and individuals. This tension is only resolved when a critical mass of individual behaviors in the collective becomes coherent (for example, a minimum critical number of youths start online gaming so that it becomes socially accepted and then economically successful). Likewise one group or cohort in a sector will find it difficult to be successful until a critical mass of groups also commits to the same practise (for example, conflicting faith systems collaborate to create a transorganizational ministerial council). Complexity science reveals that, only 10 to 15 percent of a population need change, in order that the whole system shifts towards that change (Gladwell, 2002; Hamilton, 2008).

Map 4: The Complex Adaptive Structures of Change

Map 4 conveys the stages of structural organizational change in the city. Living human systems in the city are constantly adapting to life conditions. Adaptations arise from both external causes (like geo-climatic incidents) and from internal causes (like bio-psycho-cultural-social triggers such as economic shifts).

The directions of change are best pictured as change vectors (the outward pointing arrows on Map 1) that expand the four quadrants of the whole city outward from the core. Map 4 makes visible how the city's LR organizational structures evolve over time. (They also act as proxies for the commensurate UR neural structures developing in individual brains as in Map 1.)

Map 4's trajectory of structural change, actually has no assumptions or guarantees of an ever-upward shift – the direction of change to more or less complex systems depends on the capacities of the individuals and groups (reflected in Map 3) to adapt to the challenge(s) (Beck & Cowan, 1996; Graves, 1981, 2005; Hamilton, 2008).

The value of Map 4 to HS is that it provides a map of structural complexity for a multiplicity of HS practices, expressed at all eight levels of complexity. This allows us to correlate all the Traditional, Modern, Post-Modern (and emerging Integral) discourses operating in the 21st century city (See Table 3).

What is Human Security?

Human Security (HS) is the experience of surviving, connecting with ones environment and creating the conditions to reproduce another generation – which are the characteristics of a living system (Capra, 1996; Hamilton, 2008). HS relates to species, collective and individual scale (Gasper, 2010, p. 25). HS includes being secure about: the environmental context (ecology, adaptiveness, interconnectedness and life cycles); individual thoughts and actions; and collective relationships and systems, while one applies strategies for evolutionary adaptation (Hamilton, 2008). Ironically in terms of the city – the most complex human system yet created - it appears that all major cities of the world are built on or near tectonic plates (for the very good reason that is the closest point to where the energies and resources arising from the C sphere emerge onto the outer surfaces of the planet and provide raw materials for human horticulture, manufacture and city infrastructure (Stewart, 2010). At the same time, this very juxtaposition of human systems and tectonic forces has required the constant awareness, response and adaptation to the causal perils. A meta-view of HS must consider this as a key factor in city risk assessment, which will continue as long as the planet continues its ever-evolving eruption of "natural disasters" (caused by the shifting of tectonic plates).

Thus, if for no other reason than the necessity to adapt to such life conditions, humans and cities are permanently locked into a never-ending learning cycle, because the tectonic triggers guarantee the ongoing necessity of responding with solutions to create ever-more complex adaptations to protect increasingly more complex cities. So, in lock-step with other human systems, HS evolves risk assessment methodologies and measures that embrace self, socio and world centric levels of complexity (Greiving, Wanczura, Vossebuerger, Sucker, & Fourman, 2007, p. 18). As a complex adaptive human system (col. 1), the ABC spheres create the container of space/time boundaries (col. 4), within which the focus of HS matures values systems (col. 2) that create the economic structures (col.3) that, in turn grow spans of ABC geographic influence (col. 4) and HS Focus (col.5) (as set out in Table 3).

Table 3: HS Maturity Levels

Level of System Complexity	Related Values Systems	Historical Economic Structures	ABC Spheres & Span/Boundaries	Maturity of HS Focus
Traditional: Self	1. Basics of life	Gatherer	Local	Sense HS in the city's land, sea, air and life forms
	2. Family	Gatherer/Hunter	Local Extended	Honor HS through spiritual practices that honor places and ancestors
	3. Power	Hunter/Horticultural	Region/Territory	Protect HS through tyranny of "Power

				Figures"
Modern: Socio	4. Authority	Horticultural/Agrarian	State	Authorize HS by following One Right Way
	5. Competition	Industrial	Nation	Achieve HS results through logic, science and strategy
Post-Modern :World	6. Social Safety	Industrial/ Informational	Multi-Nation	Serve HS as community justice caring for all (including diverse) members
	7. Systems Flexibility	Informational/Systemic	Eco-Region	Design systems so HS flexes and flows
	8. Global Holism	Ecosystem/Global	Globe	Enable HS as a global process related to all life on earth

Adapted from Beck and Cowan (1996), Eddy (2003, 2005), Wilber (1996), Hamilton (2011)

States of ABC Change

As cities (organizations, sectors and neighborhoods) traverse threats to security, they encounter stages of complex change, triggered by the interaction of ABC spheres and the capacity of their HS to respond to it. Starting from a **stable state** HS may undergo **turbulent/moderate change** and even **chaotic/severe change** (like Cairo and Tripoli in the 2011 Arab Spring) or **breakthrough/stabilizing change** conditions (like Beijing in the 2008 Olympics). In times of **longer term instability** and uncertainty, cities (and their organizations) risk **down spiraling into less complex structures** to find more stable HS (particularly after natural or revolutionary disasters like those in post-Hurricane-Katrina-New Orleans, post-tsunami-Sendai Japan or post-war-Sarajevo.)

Combining the Maps into a GECHS Information System

Combining the four city maps produces evolutionary lenses to view HS and create resilient HS solutions sufficient to the level of complexity facing human systems. One can organize them into a Global HS Information System (GHSIS) that reveals the tetra-arising, holarchical, evolutionary, developmental, adaptive dynamics of HS in the whole city.

Integral City GECHS

Table 4 shows the fate of various cities related to all the categories of global threats (illustrated in Figure 2) in just the year 2010-11.

Table 4: Global Threats in Cities 2010-11

Threat (Figure 2)	Manifestation	City
Psycho-Cultural-Social	Terrorism Economic Meltdown Political/Cultural Clashes	Oslo Athens, Rome Cairo + Arab Spring Cities
Bio-Genetic-Ecological	Avian Flu	Jakarta & other cities in Indonesia (anon, 2011c)
Food Scarcity	Famine	Mogadishu, Somalia
Climate	Tsunami	Sendai, Japan
Water	Flooding	Brisbane, Australia
Energy	Nuclear Meltdown	Sendai, Japan
Lithosphere	Earthquake	Christchurch, NZ

While it is easy to inventory the threats as they occur in multiple cities we tend to miss their stratified interconnectedness. Therefore, it may be more instructive to look at one locality and see the global patterns arising. In the Sidebar I have used the example of my own city of residence, Abbotsford, BC, Canada. In the last seven years, Abbotsford has had mild to major degrees of severity engaging with all of the major GEC threats (see Table 5).

Table 5: Global Threats in One City: Abbotsford

Threat	Manifestation	Year	Change State Severity
Psycho-Cultural-Social	• Murder Capital of Canada • Imagine Abbotsford Visioning • Homelessness • Poultry Industry Interruption	2007 2007-2010 2005 – ongoing 2004-5	major major moderate major
Bio-Genetic-Ecological	• Avian Flu, culled 18 million flock	2004	major
Food Scarcity	• Potato Crop Lost from Flooding • Export of most Food Crops limits access for local consumption	2010 1990-2012	Mild mild
Climate	• Spring melt-caused Flooding	2007 (anon, 2011a)	mild
Water	• Water Supply Source Threat	2011	moderate
Energy	• Sumas Energy II Co-Generation Gas Plant • Burnaby Waste-Energy Incinerator	2007 (anon, 2007) 2010	major moderate
Lithosphere	• Sumas Mountain Clay Mining Land Sliding	1992-2011	minor

Applying the Meta-Theory to HS Decision Making and Management

When examining GECHS in any city (like Abbotsford as illustrated in the sidebar), we can use a meta-security approach to design appropriate responses for threat adaptation, mitigation and/or prevention. If a design fails to align solutions along the evolutionary trajectory, the threats in Figure 2 will continue to re-occur – usually worsening on each re-occurrence. For instance, in Abbotsford an insufficiently complex paradigm for the psycho-cultural-social sphere, will cause incompetent decisions in the bio-sphere (as happened with the avian flu occurrence); which will endanger safe and secure food production, which will impact the threat of flooding caused by food production and residences located on flood plain; which can threaten the saftety and/or availability of water supply; which requires the regulation of energy usage to reduce flooding and/or deliver clean water; which is impacted by the subsidence of mud-slides.

Starting at the top of this threat chain, then, the first place that change must happen, is within the city leaders and stakeholders themselves (B. Brown, 2011). They must re-frame their paradigms to recognize they are part of the very HS paradigm, with which they are called to engage. Changing their own paradigm to embrace the ABC sequence of threats will give them the greatest leverage for change in the whole HS system (Meadows, 2008). Such a whole systems, integrated approach begins the process called "meshworking" – which meshes or weaves together responses to the ABC issues, without omitting any key factor. Core principles of meshworking (Hamilton, 2010b) are detailed in the Sidebar and include the following:

Spheres

1. Identify the change severity of the ABC spheres of the city container.

Threat(s)

2. Name and evolutionarily map the ABC environmental threat(s) in the system –.
3. Identify the purpose for HS change. Facing the ABC threat provides the impetus or catalyst to change. Create the vision for changing HS from what to what; e.g. mitigate, adapt or eliminate threat?

Stakeholders

4. Use an integral map to find the agents for HS change – engage as many stakeholders in the process as possible – actively seek out diversity and make room for difference.
5. Enable leadership to emerge to address the threat(s) at the appropriate level of complexity.

Processes

6. Amplify the threat to HS so others can see it.
7. Integrally identify the resources needed to facilitate the change and invite and involve stakeholders to contribute them.

Methodologies

8. Co-design integral methodologies for HS change that self-organize passion, purpose, priorities, people, and planet. Expect it to be messy.

Feedback Loops

9. Create target-based feedback loops and integral vital signs monitors so that participants can self-correct and develop operational HS structures that work.
10. Make the feedback accessible to all by publication and display; e.g. community newspapers, online media, real time intelligence display systems.
11. Pay forward to other stakeholders, cities, GE's, the integral learning for prevention, mitigation and/or adaptation.

Such an integral HS approach reveals how to integrate partial responses and meshwork spheres, threats, stakeholders, processes, methodologies and feedback loops into whole system, multi-level flexible strategies.

Conclusion: Helpful Signs

In conclusion we propose that GECHS for city systems have to be integrated into evolutionary sequences. HS without adaptation to GEC is impossible. Leaders in sustainability progress through the understanding of the kind of deep evolutionary change, to which we are pointing, in terms of security, sustainability and resilience, by first working *on* the system, then working *with* the system, and finally working *as* the system (B. Brown, 2011). As each leader's worldview expands, they become more closely identified with GEC evolving in themselves along with their capacity to survive and develop a spectrum of adaptive HS systems. With this integral approach, it then becomes possible to shift from the fragmentation inherent in traditional reductionism, modern management and post-modern social safety nets, to an integral HS that is globally designed but locally adapted because it is fractal, scaleable, holistic, comprehensive, pluralistic, interconnected, evolutionary and developmental.

A final note of optimism comes from returning to the threats we noted in Table 2. We offer a final Table 7 where those threats are being addressed by science that contributes to an integral approach.
Table 7: Helpful Signs

Threat	Integral Manifestation & Response	Integrally Informed Researchers & Authors
Psycho-Cultural-Social	Resilience Paradigm Shift	Holling, Bloom, Hamilton Meadows, Laszlo, Wilber, Beck, B. Brown
Bio-Genetic-Ecological	Living Systems	Miller
Food Scarcity	Plan B 3.0	L. Brown
Climate	World in 2050 Rethinking the Climate Change Debate	Smith Zimmerman
Water	Story of Water	Linton
Energy	Evolution's Edge Eco-Footprint	Taylor Rees, Wackernagel
Lithosphere	All major cities are built beside faults – it gives them access to resources from Earth's core	Iain Stewart, "Hot Rocks" Geographer

(Beck, 2010; Bloom, 2000; B. Brown, 2011; L. Brown, 2008; Hamilton, 2008; Hamilton, 2011; Laszlo, 2006; Linton, 2010; Rees & Wackernagel, 1994; Smith, 2010; Stewart, 2010; Taylor, 2008; M. Zimmerman, 2010)

Ultimately the application of an integral city approach to GECHS creates a methodology of care at all three ABC spheres (which is the Master Principle of the human hive).

Take Care of Yourself – in the Anthroposphere
Take Care of Life – in the Biosphere
Take Care of this Place – in the Cosmosphere.

SIDEBAR: Abbotsford Case Study Applying Meta-Theory to HS Decision Making and Management

Spheres

Eddy's ABC elements of global evolution (central to human wellbeing at all scales), can be quickly identified using Diamond's (2005) five factors that contribute to the survival of societies: climate, geography, friendly neighbors, unfriendly neighbors and indigenous culture. Here is how Abbotsford's spheres line up.

Cosmosphere

Located on the Fraser River flood plain, in the lee of the Coastal Mountains, Abbotsford's coastal temperate **climate and geography** determine prevailing winds, precipitation, snow pack and water tables that influence factors contributing to annual flooding.

Biosphere

Abbotsford's deforested flood plain, provides the geography for the **most intensely farmed area of North America** and the topography for an airport and transportation system that can export agricultural production (dairy, poultry, berries) to regional and global markets. These generate both revenues and major waste management threats to air, water and soil – thus creating feedback loops with Cosmosphere and Biosphere strata.

Anthroposphere

Abbotsford's **friendliest** urban neighbors (upstream in the water shed and downstream in the air shed to the east and north) share the Fraser Valley and support primary agricultural and secondary and tertiary service economies.

It's **less friendly** urban neighbors to the west (upstream in the air shed and downstream in the water shed) produce much of the air pollution and solid waste that is exported through Abbotsford en route to land fill sites (and threaten to exacerbate air pollution if a waste-to-energy incinerator is installed.) Other less friendly neighbors to the south (in Washington State, USA) allow their river(s) to silt up causing seasonal flooding into Abbotsford urban and rural lands

Finally **Abbotsford's own culture** has created values and behaviors that contribute to HS. Three founding cultures have attracted very successful farmers to manage the 75% of the city land base devoted to agriculture (e.g. Mennonites in poultry; Dutch in dairy; and Sikhs in berry farming (Hamilton, 2010a)). Collectively these cultures have created Abbotsford's traditional, modern and postmodern systems, evident in the integral quadrants.

- **LR environmental management systems** for water, waste, soil
- **UR & LR economic systems and structures** that lobby city hall for infrastructure,
- **LL value systems** that have developed residential and faith communities, and
- **UL, UR, LL service systems** in the education, healthcare and civil society sectors.

Threats

To keep this article concise we will illustrate an integral meshwork approach related to the 2004 incidence of Avian Flu (Hamilton, 2006) .

The purpose for HS response was to contain and eliminate the Avian Flu.

Stakeholders

The integral model revealed key poultry industry stakeholders (Hamilton, 2006):

a) **(UL) Individuals**: Producers, Processors, Workers, Distributors, Retailers, Consumers
b) **(UR) Bio-experts**: Veterinarians, Medical Doctors, Nurses, Micro-Biologists, Laboratories (Local, BC, CA, WHO), Animal Health (CAHC)
c) **(LL) Industry Affiliated Groups**: 4 Feather Groups, Commercial, Free Range, Backyard Breeders, Hatcheries, Marketing – Provincial, National
d) **(LR) Government Agencies**: City, Ministry Agriculture Food & Fisheries, Health Ministries, Provincial Emergency Preparedness, CFIA, WHO

Leaders (eg. Deputy Provincial Minister and Mayor) faced a plurality of values, relationships and structures in designing HS responses. Table 6 identifies eight values systems and worldviews (the most effective leverage points in a system (Meadows, 2008)).

Table 6: Hierarchy of Values Systems Related to Avian Flu

Traditional

1. Family circles physically protected the safety and survival of family members.
2. Clan and tribal unions used "family farm and/ or good old boy" agreements to preserve traditional ways.
3. Top down empires used self-serving rewards to further self interest such as producer quotas and prices.

Modern

4. Authority driven bureaucracies applied rules to do what they considered right, such as protecting supply managed commodities.
5. Entrepreneurial enterprises strategized gamesmanship to compete; eg. processors survived using foreign supply.

Post-Modern

6. Social justice networks served the common good, by supporting the social fabric for families in need.

Integral

7. Systemic webworks integrated processes and flows, like corporate and industry social responsibility.
8. Global meshes looked out for the interconnectedness of the ecology and global product distribution/transportation systems.

Processes

During 2004, the modern strategies for avian flu containment included antibiotics, surveillance, boundary management, declaration of emergency measures and culling 18 million birds. Given Canada's Supply Side Economic strategy, what got measured (the loss of production and revenues) got noticed. The protection of the supply management system marginalized both non-standard players (like backyard flock owners) and actors on the sidelines (like citizen observers and experts outside the system of interest). Because government leaders organized a strategic conference to try to prevent a recurrence of avian flu, by catalyzing policy development and implementing change and collaboration, most factory farms survived, but many smaller farmers did not (Hamilton, 2005).

Methodologies

The integral model framed (Best Practices from other global locations) and options to manage the HS issues including:

- **(UL)** Developing Bird Resilience (Canadian Animal Health Coalition (CAHA))
- **(UR)** Creating and Maintaining Bird Health (Netherlands)
- **(LL)** Developing Stakeholder Relationships and Communications
    - Connecting all stakeholders ahead of time (Texas Avian Flu Story)
    - Preventing system burnout (Toronto SARS story)
- **(LR)** Developing Healthy Industry Animal and HS Systems (CAHA)

Feedback Loops

Managing risk depended on designing four quadrant HS feedback loops (Fourman, Reynolds, Firus, & D'Ulizia, 2008; Greiving, et al., 2007; Hamilton, 2006):

- **(UL)** Ethics, Learning Capacity Building
- **(UR)** Access to Biological / Health Data

- **(LL)** Community and Industry Leadership Development
- **(LR)** Industry Collaboration System Monitors
-

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Appendix A: Maps 1-4 (copied with permission from ***Integral City*** p. 62-63)

Figure 3.7. Map 1: The integral map. Source: Adapted from Wilber, 1995, 1996a.

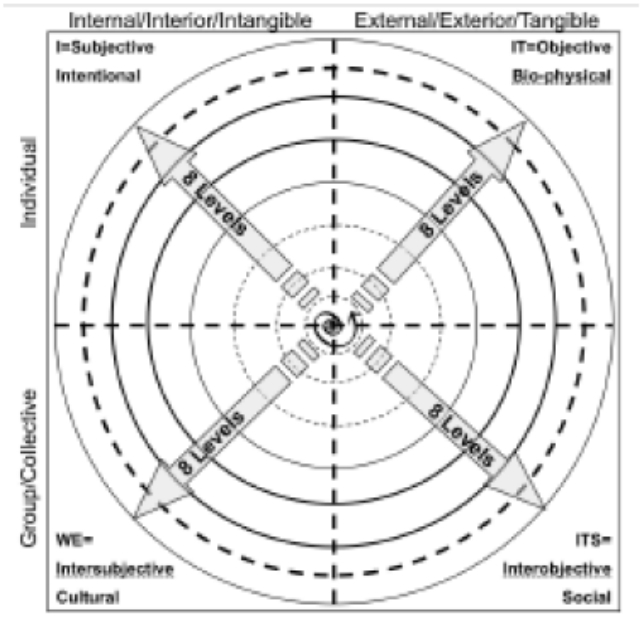
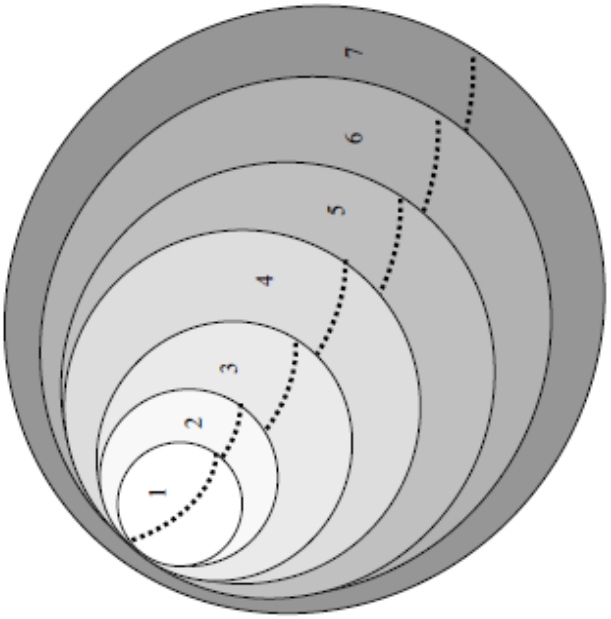


Figure 3.8. Map 2: The nested holarchy of city systems.



- 1 = individual
- 2 = family/clan
- 3 = group/tribe
- 4 = organizations: workplaces, education, healthcare
- 5 = community(s)
- 6 = city
- 7 = eco-region

Figure 3.9. Map 3: The scalar fractal relationship of micro, meso, macro human systems.

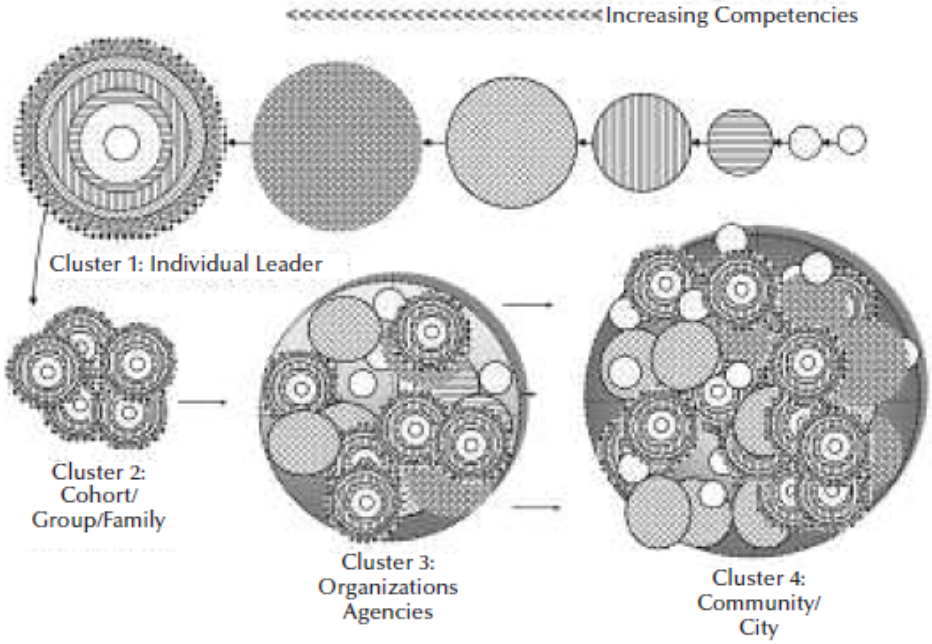


Figure 3.10. Map 4: The complex adaptive structures of city change.
Source: Beck & Cowan, 1996, Eddy 2003b, 2005.