

## City and Region Viewed as Vitae System for Integrated Disaster Risk Management

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### Synopsis

This paper proposes the Vitae System Model as a new conceptual framework for integrated disaster risk management. This model provides a holistic view of cities, regions and communities under different opportunities and threats like disaster risks. As three fundamental functions of the vitae system are to become alive (survivability), to live lively (vitality), and to live together (conviviality, communication). With some specific cases for integrated disaster risk management as illustrations, how this conceptual model provides a new insight into the scope of integrated disaster risk management.

**Keywords:** vitae system, conceptual model, integrated disaster risk management, city, region, community

### 1. Introduction

This paper proposes the Vitae System Model as a new conceptual framework for integrated disaster risk management. This model provides a holistic view of cities, regions and communities under different opportunities and threats like disaster risks.

Why should we develop this new conceptual framework? To address this question, let us start with reassessing the catastrophic earthquake event that struck the Hanshin-Awaji Metropolitan Region early January, 1995.

### 2. The Denominator of Lessons learnt from the Great Hanshin-Awaji Earthquake Disaster

(1) In the event of a catastrophic disaster (low-frequency-high impact disaster), individual household's and neighborhood community's coping capacity with evolving disaster is a "must" for overcoming the "threats to one's life".

(2) Community's coping capacity can be better trained and "actively maintained" on a day-to-day basis.

(3) Disaster mitigation practices and preparedness can be developed by two seemingly opposite approaches, one being imaginative enough to virtually experience the "severity and hardships" side of disasters, and the other being imaginative enough to virtually experience the strengths and power to cope with disasters.

(4) Community's coping capacity can be synergistically powered by "working together" with governmental and non-governmental support.

As will be elaborated later, we may well derive the following three basic functions that characterize the above seemingly separate observations. They are (i) "to become alive" or "to survive", (ii) "to live lively" or "to vitalize", and (iii) "to live together" or "to communicate". For instance, item a. addresses the criticality of overcoming the "threats to one's life". This can be interpreted to address (i) "to become alive" or "to survive". Item b. which refers to "actively maintained" may well be interpreted as (ii) "to live lively" or "to vitalize". Item c. makes a point that "severity and hardships" and "the strengths and power to cope with disasters" are considered the two sides of the same coin (enhancing community's coping capacity). Obviously the former corresponds interpretatively to (i) "to become

alive” or “to survive”, and the latter to (ii) “to live lively” or to “vitalize”. Item d. stresses the need for “working together”, which is interpreted to mean (iii) “to live together” or “to communicate”.

Note that the “denominator” of the above four items is “community’s coping capacity”. In fact the essential aspect of “coping capacity” is that it is the most unique characteristics of any living body. It is distinct from a mechanistic body such that any living body only can enhance or degrade its coping capacity if it is challenged by an external shock.

### 3. Prototype Model of the Vitae System

The conceptual method proposed to address the above-mentioned problem is the Vitae System Model first developed by Okada (2002, 2005b, 2006). This conceptual model claims to view cities, regions and communities as living (vital) integrity with robustness and resiliency in its coping capacity. As Fig.1 shows, the model is depicted as a triangular body with three nodes as fundamental functions of any living body. The area of the triangle is interpreted to represent the degree of viability, a property to characterize the range of coping capacity. Assuming an external shock being imposed, any reactive, positive marginal expansion made successfully outwards of each edge of the triangle results in a non-negligible increase in viability (enhanced coping capacity). On the contrary any reactive negative expansion might lead to a decrease in viability (degraded coping capacity). Note that if excessive outwards expansion (positive or negative) is challenged by an external shock, it may end up with the collapse of the vitae system. This implies that the vitae system by nature has a limited range of expansion. (For this discussion, see Misra and Okada (2005).)

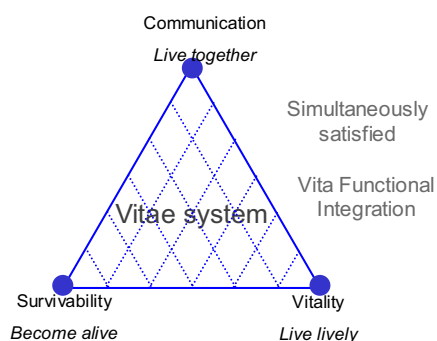


Fig. 1 Prototype Model of Vitae System

## 4. Three Properties of the Vitae System Model

Let us now introduce three kinds of fundamental properties for the Vitae System Model.

### 4.1 Holism

The vitae system has the property of “holism”. This means that those three basic functions of the Vitae System which correspond to each apex of the triangle are not entirely separated but mutually interactive and interrelated, thus a balanced coordination of the three making the living body integrated. Let us call this integration “Survival-Vital-Communication holism”.

### 4.2 Biorhythm

Like any living body the Vitae System is characterized by its own built-in biorhythm. A typical of it is the cyclic change of “tension-relaxation” and fluctuations between “regular-irregular” (see Fig. 2 and Fig. 3).

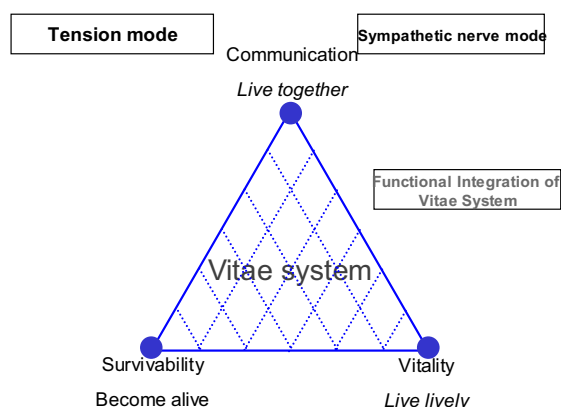


Fig. 2 Tension Mode of Vitae System

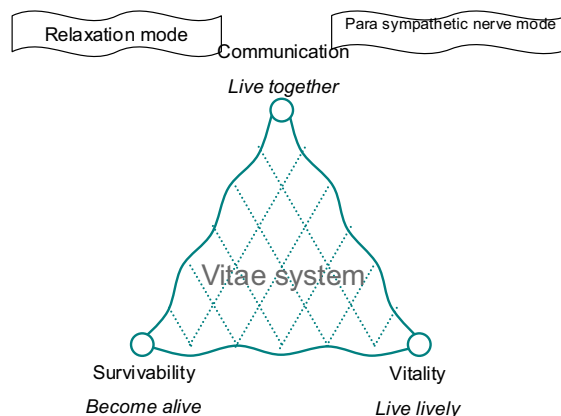


Fig. 3 Relaxation Mode of Vitae System

Fig. 4 illustrates an elaborately designed time-dynamic Vitae System. Note that even in the daily life mode there are small fluctuations caused around a regular level, thus making it always rhythmically prepared for inexperienced disaster shocks coming from outside environments. Real living things are good examples of Vitae Systems. They hold biorhythm as a time-evolved elaborate device to cope with external shocks, many of which are unknown and inexperienced to themselves but somewhat anticipatable through their accumulated experiences of past “similar challenges”, and thus trained themselves and quite prepared for such future shocks.

### Vital Rhythms

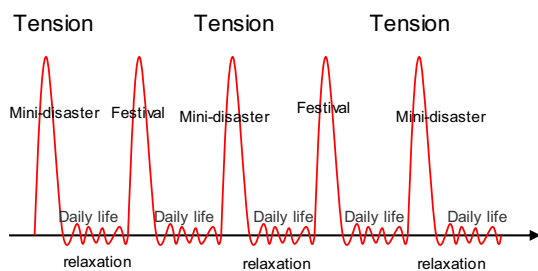


Fig. 4 Vital Rhythm from a Tension Mode to Daily-life Relaxation Mode and Vice Versa

Notably such biological systems have developed a built-in internal biorhythm to cope with external shocks. For example, sympathetic and parasympathetic nerve systems, one for “tension” mode, and the other “relaxation” mode, are always counterbalancing each other to rhythmically coordinate the human body against external shocks.

### 4.3 Communalism

The third unique property of any living body is what we may call “communalism “. This means that a living body can exist only as a member of a “community” where other members of living bodies are indispensable. A living body needs other living ones and vice versa. “Communalism” refers to this fundamental condition for any living body as a “social existence”. There are two types of interactions among living bodies, mutually complementary and mutually exclusive. The former takes a form of “cooperation” or “collaboration”, and the latter a form of “adversary” or “conflicting” relationship. Importantly both types of interactions are not totally incompatible each other but rather mutually

complementary over different phases of life span time. This property is considered consistent with and corresponds to the basic function of “to live together” or “to communicate” of the Vitae System. As depicted in Fig. 5, this is modeled as the networking property of Vitae Systems.

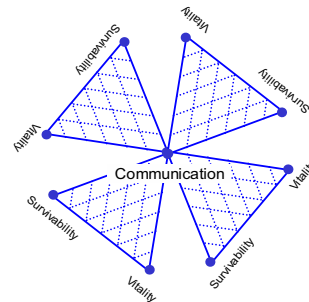


Fig. 5 Networking Property of Vitae Systems

As mentioned before, each Vitae System has a limited capacity to expand. However the networking property of multiple Vitae Systems will enable them to overcome this limitation as a whole. Their entire capacity of the networked community is considered a synergetic scope of expansion., evolving from each Vitae System.

## 5. Illustrations

### 5.1 Integrated Drought Management: Case Study of Nagasaki City, Japan

Okada has studied Nagasaki City’s long-term drought management practices and found that a bundle of proactive and anticipatory practices by multiple stakeholders (municipal government, citizens and mass media) have evolved as a biorhythm-built-in integrated disaster risk management. Okada has claimed that annual event of intensive water-saving campaigns for citizens timely practiced every year as well as a ten-year anniversary event to remember the past catastrophic drought disaster (1994-1995) participated by all stakeholders, have proved to serve as an elaborate participatory drought disaster mitigation management. Figs. 6 to 8 give an outline of this study results. For more details see Okada (2002). They correspond to Fig. 4 which illustrates the Vital Rhythm from a Tension Mode to Daily-life Relaxation Mode and Vice Versa .Note that this Nagasaki case is a typical example of what the Vitae System can help us develop a long-term strategy for integrated drought disaster Management.

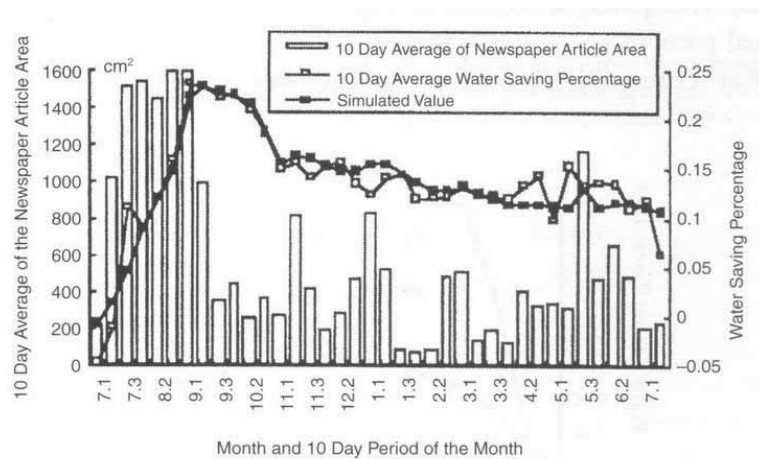


Fig. 6 Nagasaki Long-term Drought Management (1)

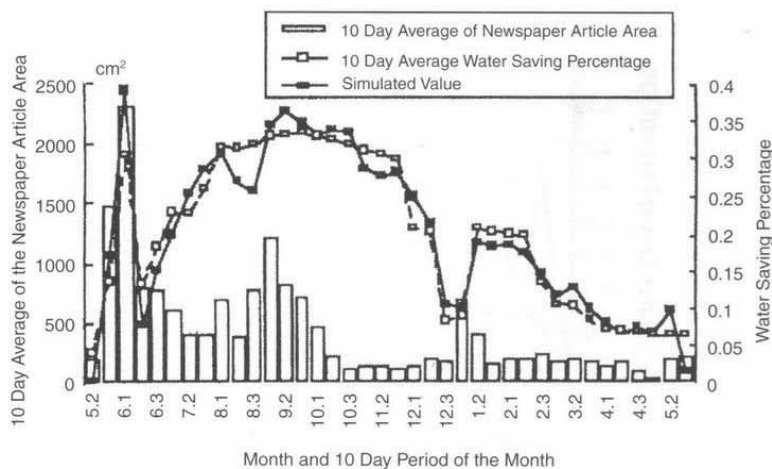


Fig. 7 Nagasaki Long-term Drought Management (2)

## 5.2 Urban (regional) disaster diagnosis as integrated urban (regional) risk management

Urban (Regional) Disaster Diagnosis (UDD, RDD) is proposed by Okada (2005a, 2005b, 2006) as a methodology

- To overall assess the spatial risks of urban, regional and community areas under disaster threats.
- To serve as a scientific framework to make a holistic diagnosis of the current status (status-quo) of safety and security of the urban space focused, and
- To prescribe prospective countermeasures to enhance their quality.

### (1) Basic characteristics of UDD

Characteristically UDD is to be operated as a PDCA cycle process management in a participatory manner. The following points are important.

(a) PDCA cycle consists of Plan-Do-Check-Action

repetitive process (see Fig. 8).

(b) Unlike conventional urban planning and management, UDD starts with “Check” on the current status (status-quo) of safety and security of the urban space focused.

- Experts (divided) own knowledge partially, and local residents complementary own their local knowledge.
- This requires participatory approach and public-private partnership.
- After proceeding to “Action” which necessitates continued formation of communication platform, thereby involving further stakeholders if necessary.
- With this done, UDD sets up “Plan” with a view to prescribing prospective countermeasures to enhance the quality of the current common space.

### (2) UDD as analogy with physiological risk assessment

Interestingly UDD has its methodological foundation

on its analogy with physiological risk assessment. This is an implicit linkage with the view of the Vitae System. The following points are made in this connection.

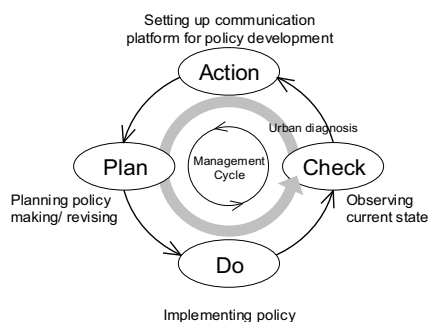


Fig. 8 Plan-Do-Check-Action (PDCA) Cycle Process

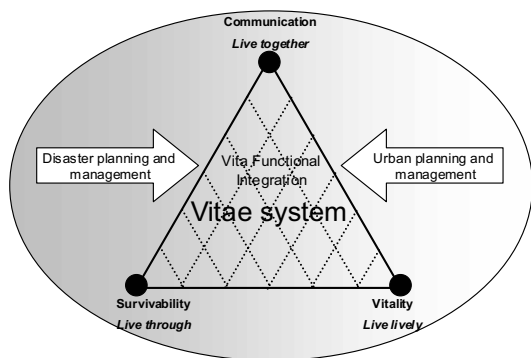


Fig. 9. Integrated Urban (Regional) Management Viewed as Vitae System

(a) UDD is designed analogous to a liberal, sound relationship between medical doctors (corresponding to disaster and urban experts) and patients (corresponding to local citizens).

(b) The methodology is founded on the vision that cities, regions and communities are living body systems, and not mechanistic bodies as conventionally treated.

**(3) Challenge towards integrated urban (regional) risk management by use of the Vitae System Model**

Knowing the above-mentioned significance of managing cities, regions, and communities as living systems, it may be a reasonable next step to contemplate on basing our methodological framework for integrated disaster risk management (IDRiM) for cities, regions and communities on the Vitae System Model. For this

challenge the following items are instrumental.

(a) Disaster planning and management and urban (regional, and community) planning and management should be more appropriately merged together.

(b) We still miss such a methodology for the risk management of common space (cities, regions and communities) which is conceived as consistently under disaster “threats” and other urban development “opportunities”. Note that such “threats” and “opportunities” can be considered the two sides of the same coin, In other words they are modeled as “external shocks” challenging the Vitae System from outside environments. Depending on its own coping capacity, and according to the extent the “actual self-governor of the vitae system” can be involved in the process of governance, such external shocks can be perceived and treated as different risks and chances.

With the above points in mind, Fig, 9 presents a new way to look at urban (regional, and community) planning and management in a coordinated framework based on the Vitae System Model. It is remarked that the conventional disaster planning and management tended to be heavily biased towards the left hand of the Vitae System, whereas urban and regional planning and management tended to address to just the opposite side of the vitae system. Thus what the Vitae System Model implies us is that in this new century we need to take a challenge to integrate both types of common space planning and management problems in a more unified framework. Beside the above applications there have already been some research works carried out to introduce this vitae system framework. For interested readers, see Misra and Okada (2005) and Xu (2006).

**6. Conclusion**

We are still in the primary stage of developing a new perspective and provide a systematic methodology to address the fundamental questions raised in this paper. However as has been clarified in the above discussions, it is hoped that the proposed Vitae System Conceptual Model will provide us with an innovative way to conceptualize and systematically examine relevant policies, strategies and practices for integrated disaster risk management in a sustainable manner.

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## 生命体システムとしてみた都市・地域と総合的な災害リスクマネジメント

岡田憲夫

### 要旨

本研究は総合防災のための新しい概念フレームワークとして、生命体システムモデル ( Vitae System model ) を提案する。このモデルにより、都市 ( 地域、コミュニティ ) をまるごとのシステムとみなすとともに、災害リスクなどの多様な機会や脅威の下にある都市のリスクマネジメントを検討することができることを示す。生命体システムの3つの基本的要件として、①生存力 ②活力 ③コミュニケーション力 が挙げられる。具体的事例を用いて本モデルの適用可能性を例示し、今後の災害リスクマネジメントにどのように有用であるかについて議論する。

**キーワード:** 生命体システム、概念モデル、総合防災、都市、地域、コミュニティ