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Applied Network Integration

A Process for Integration of Global Networks to Achieve Sustainability of Aquaculture and Aquatic Ecosystems

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Abbreviations:

Aqua/Eco:	Aquaculture and aquatic ecosystems
hi E:	A state of high emotional energy characterized by appreciation, empowerment, creativity, peaceful coexistence etc.
NE:	Network Enterprise
NI:	Network Integration

ABSTRACT

Sustainability of aquaculture and aquatic ecosystems has been identified as an area of critical environmental concern globally. Various challenges deter efforts for critical collaboration between sectors of the industry. We present an evidence-based model for Network Integration with direct applicability to stakeholders with interests in Aqua/Eco which has been validated in multiple global contexts. We suggest that acknowledging the need for and describing a network business system, creating a culture of high emotional energy and experiential learning are fundamental steps towards network integration and improved ecosystems management.

Introduction

Sustainability of aquaculture and aquatic ecosystems (Aqua/Eco) continues to be a critical priority for all actors globally, including government at all levels, business value chains, academic institutions, non-profit organizations, the media and the public at large [1]. For many reasons, Aqua/Eco may be viewed as a model for effectiveness of 'One Health' initiatives - a WHO

term which captures the interconnectedness between human population health, animal health and environmental health and the requirement to address all of these in a holistic manner in order to effect change [2, 3]. Indeed, numerous authors have identified collaboration among multiple stakeholders as a prerequisite to address One Health sustainability objectives and its numerous challenges. These include differences in values, priorities and beliefs between stakeholders, creating sustained leadership and an effective way to fund and scale relevant initiatives [2, 3, 4]. We present here a coherent, evidence-based model for Network Integration (NI) with direct applicability to stakeholders with interests in Aqua/Eco which has been validated in multiple global contexts.

Integration of complex multi-stakeholder networks can be understood in part by reflecting upon the effectiveness of networks with which we have more direct experience. One category of such networks consists of what we are familiar with as 'institutions'. These include businesses, government agencies, non-governmental organizations (NGOs), and educational institutions and so on. A powerful and informative reflection then consists of the following: Why is it that such organizations (which we shall term Internal Networks) can operate highly effectively - delivering value to internal and external stakeholders consistently, sometimes over many years - whereas networks consisting of more diverse stakeholders (which we call here External Networks) typically lack this level of effectiveness?

A useful answer which provides a model for predictable success is that Internal Networks typically operate under a Business System [5] - something understood explicitly by those educated (or self-educated) in business or public administration and intuitively by those who have worked in institutions or have otherwise encountered them. External networks typically lack such explicit and effective Business Systems [6]. It's important to note that this terminology does not imply that all such enterprises are businesses, nor that they ascribe to an ideology or outcomes typical of corporate or other business entities (e.g. academic institutions, NGOs, hospitals etc.).

The notion of a Business System can be used as a template for a network of any size - from one person to a team, an institution or even the entire global human network. In Figure 1 we offer a generic model for enhanced network functioning, which we term the Business Engine; it is both a conceptual framework and a practical experiential learning tool that we have tested extensively in enhancing the functioning of individuals, teams, organizations and global networks which is fully applicable to Aqua/Eco. This model also illustrates why many External Networks may fail to function optimally. They often lack some combination of well-articulated vision and associated leadership committed to the benefit of everyone involved; a coherent strategy to raise required funding; effective authentic communication; and effective systems to support business functions etc.

Another distinction here relates to the organization of most Internal Networks compared to many effective External Networks. The majority of the former operate under what may be viewed as a hierarchical management system; this includes some form of branching structure reflecting authority, lines of communication etc. Yet the evidence suggests that the most effective external network organizations are structured as Distributed Networks [7]. These are typified by the absence of a single identifiable leader or lead organization and functioning through some form of participatory democracy. This helps to create trust among groups who haven't historically collaborated closely. It also helps to ensure flexibility and longevity of the network enterprise. Frequently cited examples include Alcoholics Anonymous, open source software platforms and certain First Nations communities, although the list of emerging distributed networks is rapidly expanding to include virtually all areas of human activity [8]. A third relevant structure has been termed the Hybrid organization which shares characteristics of the two [7].

A second valuable reflection is then: How do External Networks (within Aqua/Eco and otherwise), which consist primarily of individuals, most of whom have little experience in creating ***new*** enterprises and relatively little direct familiarity with distributed networks, assemble to build an effective network business process (e.g. an entrepreneurial network start up enterprise) and thereby enter fully into the collaborative economy? And how do we make this a repeatable process so issues in Aqua/Eco (and other networks) can be effectively addressed?

Well documented (though yet widely recognized) principles of social psychology offer important clues [9, 10]. Although it is beyond the scope of this article to define these in detail, we provide readers here a brief overview of some of

the salient features (see Figure 2). Further details of the psychology of individual engagement can be found elsewhere [9]. The Novometrix Research Inc. web site [11] provides an emerging resource for user adapted information on and participation in NI projects as this is best learned experientially in alignment with individual and institutional priorities.

As per Figure 2, the creation of network solutions platforms (which we use interchangeably with Network Enterprise or NE) is initiated through natural leadership within the network. This is often (though not necessarily) an individual catalyst [7] or group outside of the established institutions with a strong psychological propensity for collaboration and with an interest in benefiting other network members. This enables leadership and management of the network to be operated as a third party entity that facilitates trust. Often, effective NEs build upon existing network groups and focus on engaging additional key stakeholders, linking to other networks and enhancing the NE business processes (as per Figure 1).

In this approach, effective leadership typically focuses on engaging early adopter collaborators (i.e. Individuals and organizations who also have a natural tendency towards collaboration). Additional network members are then engaged according to adopter curve theory [12]. Engagement is facilitated through the creation of a common narrative that most network participants can buy into, such as: We all agree that sustainability of Aqua/Eco is an important issue that affects all of us. It also depends on the effective use of psychological principles of engagement such as demonstrating a benefit to all network members, engaging the principle of social proof (which states that individual beliefs and decisions are based heavily on those of one's peer group) [9, 13].

We have found that consciously acknowledging the need for and describing a network business system as in Figure 1 to be very helpful for early adopters. For those interested in invoking integration of their network or otherwise optimizing individual or institutional effectiveness within Aqua/Eco, cultivating a culture of high emotional energy (hi E) is, in our experience [10], the single most important element to success [14]. The reasons are self-evident; a culture typified by passion and beliefs such as "We can do this - let's work together" creates a self-fulfilling prophecy and draws in the necessary strategies, talent and momentum to make this a reality. Often this materializes through small, scalable, data-driven pilot projects that engage key early adopters from across the network and which explicitly drive economic value to support the process.

Experiential learning (e.g. through trial and error) is simply a necessary part of the process. For early adopters, who embody hi E, it can also be very rewarding and motivating. The resulting successes are then used as a basis to engage the next ring of adopters [9, 12], which is facilitated by further enhancing the effectiveness/sophistication of the network business systems (Figure 1).

Network Integration may be viewed as an emergent process [15] aligned with a global societal desire to achieve individual and collective outcomes [16, 17] (e.g. economic, social and environmental sustainability) that are best achieved through large scale collaboration, now possible through the widespread adoption of information technology. The process is also non-linear and may be viewed metaphorically as fractal [18] (see Figure 3). For example the mutually intersecting components of the Business Engine (Figure 1) operate at multiple levels of organization and can produce an infinite value matrix for participants (individuals or groups) functioning within multiple intersecting networks. The principles of NI apply equally to enhanced functioning of Internal Networks (corporate, government, NGO, academic, etc.), although this is beyond the scope of the present article.

Conclusion

Integration of stakeholder networks is a critical process to ensure achievement of sustainability objectives within the Aqua/Eco sector. We invite readers to visit the Novometrix Research Inc. website [11] for further information and the opportunity to observe a variety of global NI initiatives in progress and to participate in an emerging collaborative network initiative to create solutions in Aqua/Eco sustainability

Conflict of Interest

No conflicts of interest to declare.

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Figure 1: The Business Engine.

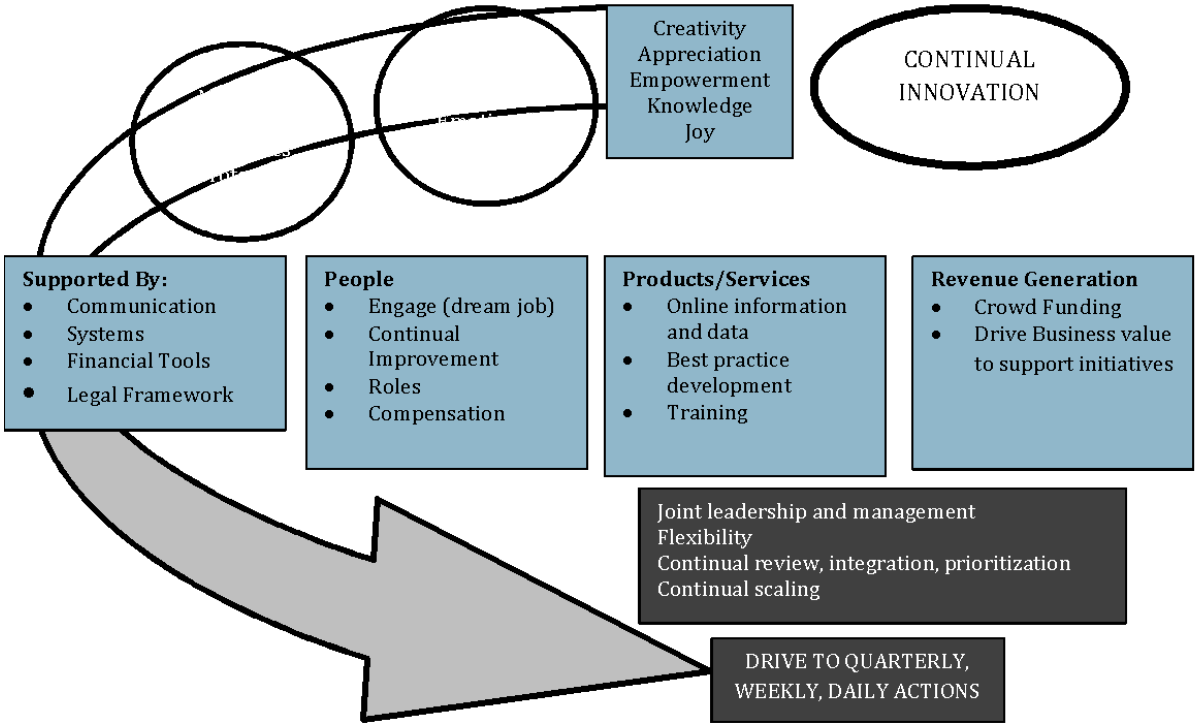

Figure 2: Some elements of social psychology and strategy related to assembly of network enterprises within aquaculture and aquatic ecosystems (Aqua/Eco) and otherwise.

- Natural leadership with psychological propensity to collaboration and social benefit
- Create third party transparent collaborative structure
- Assemble existing network components beginning with early adopter collaborators
- Align on a common narrative
- Psychological principles of ethical engagement (e.g. show benefits, social proof etc.)
- Name and build business systems through dialogue
    - Culture of High Emotional Energy (hi E)
    - Entrepreneurial
- Focused pilot projects - scalable, data-driven and revenue generating
- Experiential learning
- Repeat and scale to engage next ring of adopters
- Nonlinear, fractal, emergent

Figure 3: Understanding Network Integration can be facilitated by representing it visually as a fractal process.