12th CCRTS: 2007
ADAPTING C2 TO THE 21ST CENTURY
TITLE: Organizational metrics: A progress report
Topics: Track 5; Track 6; Track 4

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Abstract

The traditional model of an organization is predicated on the correspondence between reality and the aggregated observations reported by its individual members. But the evidence indicates that observational data alone cannot reconstruct an organization's actual status (Levine & Moreland, 1998). The well-known result is that traditional organizational theory has failed (Weick & Quinn, 1999), leading Pfeffer & Fong (2005) to propose that illusions are a critical missing ingredient. We agree, and have constructed an alternative to assume that social reality is predicated on a bistable interdependence between observational illusions that may not correspond to reality ("fog of war") and physical actions.

Report Documentation Page

1. REPORT DATE **2007**	2. REPORT TYPE	3. DATES COVERED **00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE **Organizational metrics: A progress report**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Paine College,1235 15th Street,Augusta,GA,30901-3182**	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
Twelfth International Command and Control Research and Technology Symposium (12th ICCRTS), 19-21 June 2007, Newport, RI

14. ABSTRACT
The traditional model of an organization is predicated on the correspondence between reality and the aggregated observations reported by its individual members. But the evidence indicates that observational data alone cannot reconstruct an organization's actual status (Levine & Moreland, 1998). The well-known result is that traditional organizational theory has failed (Weick & Quinn, 1999), leading Pfeffer & Fong (2005) to propose that illusions are a critical missing ingredient. We agree, and have constructed an alternative to assume that social reality is predicated on a bistable interdependence between observational illusions that may not correspond to reality ("fog of war") and physical actions.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**6**	

Introduction

Organisms live under uncertainty partly dispelled by social interaction (Carley, 2002). To survive, they form organizations as centers of cooperation (Ambrose, 2001) that marginalize opposing beliefs among its members in exchange for a share of the resources, but the tradeoff reduces adaptation to change. We have applied our model to a web-based metric for Marine Corps weather forecasters (Lawless et al., 2006a); to an extension of the metric to a reorganization of a Management Information System at a University in the E.U. (Lawless et al., 2006b); in an ongoing study (MDRC; see below under "Future Research", to measure the performance of a military medical department research center (Lawless et al., 2006c); and, in the next potential application, to an online web system to measure the performance of a university's graduate school of business (Lawless et al., 2007). This versatile metric derives from the quantum model of interdependence for the social interaction (Wendt, 2005), one of the subjects for a AAAI symposium at Stanford in 2007 (www.aaai.org/Symposia/Spring/sss07symposia.php#ss08). It assumes that information entangled among social objects once measured collapses into one of two interdependent observables, necessarily losing all information on the non-observed variable.

The loss of information opens a new area of study as indicated by tracking the tradeoffs in two very different studies. First, in a meta-analysis of over 30 years of research, Baumeister and his colleagues (2005) found that an individual's self-esteem was strongly consistent with their other worldviews but not with their academic or work performances. Then in field studies of the Department of Energy's Citizen Advisory Board (CAB) recommendations on cleaning up nuclear wastes at DOE sites, we have found that

decisions by consensus ruled CAB's were rationally consistent but not practical for their

DOE sponsor, while decisions by majority ruled CAB's were inconsistent but practical

(Lawless & Whitton, 2007).

Next, we exploit the theory by applying it to business mergers or military

coalitions. When a market is highly fragmented, like the current U.S. airline industry, it is

unable to act cohesively, characterized on average by a loss of profit or success. In late

2006, US Airways made a hostile offer for Delta Airlines that, if enacted, could

consolidate the U.S. airline industry. As the average size in market share increases, a more

focused business model implies an increase in execution in one tradeoff parallel with

another that increases the market's capacity to put more resources behind decisions to

make its average execution of plans quicker. A more focused coalition twice the size of a

fragmented coalition should execute in one-half the time (where a focused business model

can reflect a reduction of organizational duplication, personnel or overhead expenses; or in

parallel, an increase in operational readiness could occur with the wider deployment of

new technology).

Future Research: Military Medical Department Research Center (MDRC)

Our evaluation of field data (Lawless et al., 2006c) shows that the standing of

MDRC within the Army research community could be improved by increasing its research

productivity impact index by the:

1. Accurate capture of all scholarly products being produced by MDRC,

2. Encouragement to increase the number and quality of research protocols and those

    scholarly products produced by each protocol, and,

3. Continued application for external funding.

A system that effectively captures all aspects of the research process, from protocol submission and processing to publication of scholarly products or novel therapeutics will generate the highest quality data for productivity analysis and metric development. Based on field research, we believe this can best be achieved by developing an electronic protocol submission and management system with the capacity to generate real time metrics of productivity and quality (Lawless et al., 2006c). To achieve this end we intend to submit to the Army Medical leadership a business case analysis to fund this endeavor (our proposal has already been drafted; presently, we are hashing out the details of the metrics and beginning to consider commercial and other systems).

There are a number of commercial products available to meet some of these needs that address protocol submission and management. However, these products require modest customized re-engineering to permit metric tracking. On the other hand, a system could be developed that would process the necessary research documents and track productivity as well as provide a metric to assess the quality of research performed and publications from that research.

We have begun a process within MDRC that more accurately captures the scholarly products generated, which includes a publication clearance policy and internal education of investigators on the process. Currently, this is a paper-based process without the ability to track metrics. However, utilization of the system described above has the potential to facilitate this process immediately.

Going well-beyond MDRC, this system has the potential to be developed into DoD-wide electronic research data system with embedded metric tracking tools to

accurately access organizational productivity and quality. Once these data are captured by such a system, research centers, including MDRC, could apply business tools in accord with our metrics, such as Lean Six Sigma, to identify problem areas, enable corrective measures, and initiate actions that would deliver the highest quality and beneficial research product for the taxpayer.

References

Ambrose, S. H. (2001). "Paleolithic technology and human evolution." <u>Science</u> **291**: 1748-53.

Baumeister, R. F., Campbell, J.D., Krueger, J.I., & Vohs, K.D. (2005, January). Exploding the self-esteem myth. <u>Scientific American</u>.

Carley, K. M. (2002). <u>Simulating society: The tension between transparency and veridicality</u>. Social Agents: ecology, exchange, and evolution, University of Chicago, Argonne National Laboratory.

Lawless, W. F., Bergman, M., & Feltovich, N. (2006a). A physics of organizational uncertainty. Perturbations, measurement and computational agents. <u>Computational Economics: A Perspective from Computational Intelligence</u>. Shu-Heng Chen, Lakhmi Jain, & Chung-Ching Tai. Hershey, PA, Idea Books, 268-289.

Lawless, W. F., Bergman, M., Louçã, J., Kriegel, Nicole N. & Feltovich, N. (2006b). "A quantum metric of organizational performance: Terrorism and counterterrorism." <u>Computational & Mathematical Organizational Theory</u> Springer Online: http://dx.doi.org/10.1007/s10588-006-9005-4.

Lawless, W. F., Wood, J., Everett, S., & Kennedy, W. (2006c). <u>Organizational Case Study: Theory and mathematical specifications for an Agent Based Model (ABM)</u>. Agent 2006,

Chicago, IL, University of Chicago--Argonne National Laboratory.

Lawless, W. F., & Whitton, J. (2007). "Consensus driven risk perceptions versus majority driven risk determinations " <u>Nuclear Futures</u> **3(1)**: 33-38 (published by the British Nuclear Energy Society).

Lawless, W. F., Howard, C.R. & Kriegel, N.N. (2007, forthcoming). <u>A quantum real-time metric for Networked and Virtual Organizations, Networked and Virtual Organizations</u>, Idea Publisher.

Pfeffer, J., & Fong, C.T. (2005). "Building organization theory from first principles: The self-enhancement motive and understanding power and influence." <u>Organization Science</u> **16**: 372-388.

Weick, K. E., & Quinn, R.E. (1999). "Organizational change and development." <u>Annual Review of Psychology</u> **50**: 361-386.

Wendt, A. (2005). Social theory as Cartesian science: An auto-critique from a quantum perspective. <u>Constructivism and International Relations</u>. S. Guzzini, & A. Leander. New York, Routledge**:** 181-219.