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Use of a Modified Social Cubism Conflict Analysis Model for Environmental Health Practice: A Method Application Case Study During Indoor Air Quality Investigations

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Abstract

The existing literature associates poor health with mold in indoor air. However, there is no regulated exposure limit or standard for analysis of airborne mold spores and most other bioaerosols in indoor environments. Thus, conflicts arise between employees, employers, health care organizations, legal and public affairs representatives, and regulatory agencies, preventing timely solutions and resulting in continued exposures, acute and chronic illness, resource expenditures, property damage, and failure to implement appropriate controls. Additionally, conflict may arise because stakeholders have conflicting interests regarding environmental health concerns, leaving environmental health professionals to resolve the problem. Conflict analysis and resolution skills are vital in these situations. Social cubism is a conflict analysis model developed to analyze ethnopolitical conflicts, but can potentially be used in health care settings. An inter-organizational conflict during an indoor air quality investigation was dissected using the social cubism model. The inter-related factors that cause and escalate conflicts and permit their proliferation were identified using the analytical strategy, exhibiting the potential use of this tool for conflict resolution in environmental health.

Keywords: Social cubism, Conflict analysis, Environmental Health

Introduction

Conflicts in the workplace present challenges that affect career development, office cohesiveness, efficiency, morale, and productivity, and can strain professional collaboration (Ramsay, 2001; Shufutinsky, Johnson, & Trojan, 2014). This can be critical in health care, where providers, organizations, and patients are affected (Wilmot & Hocker, 2011).

To many managers, conflict management is not intuitive and is unpleasant. However, it is essentially unavoidable. To prevent destructive relationships, leaders must learn to identify and resolve inter- and intra-organizational conflict through analytical methods (Strutton & Knouse, 1997; Wilmot & Hocker, 2011).

Need for Conflict Analysis and Resolution in Environmental Health

Environmental organizations are not strangers to conflict and have had to implement conflict analysis and resolution (CAR) methods in many scenarios, including mediation to resolve land and resource disputes and environmental justice conflicts (Dahl, 2003; Soliman, Derosa, Mielke, & Bota, 1993; Shufutinsky, Johnson, & Trojan, 2014; Stokes, Hood, Zokovitch, & Close, 2010; Waller, Louis, & Carlin, 1999). This is particularly important in situations where regulatory exposure standards and analytical method guidelines are limited or do not exist, such as investigations of indoor air quality (IAQ) and mold (Breeding, 2003; Macher, 1999).

The administration of environmental health (EH) science is rooted in risk assessment, risk communication, and risk management, dealing with a diversity of stressors that often affect the health of the public (Shufutinsky, Johnson, & Trojan, 2014). During Environmental Health (EH) investigations, conflicts can arise that involve EH inspectors, EH managers, inspected establishments, affected bystanders, and regulatory agencies.These conflicts can affect timeliness of hazard communication, reporting, and remediation. To resolve such conflicts, practitioners must have the capability to dissect and analyze the core elements within the conflicts (Porter-O'Grady, 2004; Ramsay, 2001).

IAQ is an inherently conflict-rich topic because many pollutants do not have established regulatory standards and exposure limits, potentially leading to disputes between employers, employees, regulatory agencies, EH inspectors, and health providers (Breeding, 2003; Burge, 2004; Maher, 1999). Although the World Health Organization has published IAQ guidelines, there is a lack of regulatory exposure criteria for most biological agents (National Institute of Occupational Safety and Health [NIOSH], 2013). These standards are limited as result of numerous factors including a lack of methods for sampling or measurement of some organisms or toxins and differences in sensitization of the exposed (Barrett, 2003; Shufutinsky, 2004). Neither the NIOSH nor the Occupational Safety and Health Administration (OSHA) have established occupational exposure limits for airborne fungi and other bioaerosols (Shufutinsky, 2004). A conflicting picture regarding IAQ pollution and health effects exists in literature and causal association between IAQ and disease remains weak (Hardin, Kelman, & Saxon, 2003; Kuhn & Ghannoum, 2003).

Because EH inspections have numerous stakeholders, and conflicts can arise between inspectors, workers, executives, and regulatory agencies, experts from 13 national EH organizations and agencies have realized the importance of conflict resolution and have identified conflict resolution as a needed core competency in EH practice and training (National Center for Environmental Health [NCEH] & American Public Health Association [APHA], 2001; Porter-O'Grady, 2004; Ramsay, 2001). Nonetheless, there continues to be a lack of conflict resolution training in academic EH programs. While some EH management courses touch on topics related to CAR, none of the EH or industrial hygiene (IH) graduate programs accredited by the Accreditation Board for Engineering and Technology (ABET) or the National Environmental Health Science Protection and Accreditation Council (EHAC) currently offer courses dedicated to CAR in EH (Accreditation Board for Engineering and Technology [ABET], 2012; National Environmental Health Science & Protection Accreditation Council [EHAC], 2012; Shufutinsky, Johnson, & Trojan, 2014).

Conflict Analysis Models and Conflict Resolution

To effectively manage intra- and inter-organizational conflicts, leaders must first understand the aspects behind them. An effective conflict analysis model must be used in the resolution process (Fisher, 2007; Hare, 2002; Byrne & Senehi, 2007; Wilmot & Hocker 2011).Various CAR models exist and are used today, including TRIP Analysis, SWOT Analysis, and Fishbone, among others (Fine, 2011; Kelly & Johnson, 2006; Minnesota Department of Health, n.d.; Shufutinsky, Johnson, & Trojan, 2014;Wilmot & Hocker, 2011). There is no single specific dimension that can encompass the causes and dynamics of conflict (Byrne & Nadan), however, critical factors not addressed by other analytical models are addressed by social cubism (Byrne, Carter, & Senehi, 2002; McKay 2002; Shufutinsky, Johnson, & Trojan, 2014).

The social cubism conflict analysis model

One of the most powerful strategies for analyzing conflict is social cubism. Historically used to assess ethnic and political conflict, the literature suggests that the model can be used to analyze and understand micro-conflicts that occur between and among smaller groups (Byrne, Carter, & Senehi, 2002; McKay, 2002). These organizations potentially include EH practices, such as IAQ investigations.Social cubism emphasizes the multi-factorial interaction of the elements of conflict. Using a Rubik's Cube® as a visual representation (Figure 1), each side represents one of six main elements of conflict, and the mixture of colors in a turning cube represents the interaction of the factors causing the conflict (Byrne & Nadan, 2011; McKay, 2002). Normally, the six interrelated forces in a conflict are history, religion, demographics, politics, economics, and psychocultural factors. However, a modified cube can be applied in which religion is replaced with balance of power as a factor (Kent & Morrow, 2012). This interactive and diagnostic tool combines the study of the six influencing factors simultaneously as they are not isolated from one another. It is the interaction of these six faces of the cube that produce the trajectory of conflict (Byrne & Nadan, 2011). By focusing on all six instead of giving preference to any individual factor, this model is capable of producing a complete analytical picture of the conflict (Byrne, Carter, & Senehi, 2002).

Six sides of the social cube: Conflict resolution theorists and practitioners have begun to understand that they must carefully consider the inter-related factors that interact to create, escalate, and proliferate conflict (Byrne, Carter, &Senehi, 2002). Social cubism illustrates this (McKay, 2002).

Historical Factor: One of the biggest weaknesses of other conflict analysis models is the failure to address history in conflict analysis. This is evidenced as one of the critical challenges faced by conflict resolution experts (Byrne, Carter, & Senehi,

2002; McKay, 2002). Each group in a conflict has its own historical narrative and must be recognized to understand group dynamics and perspectives (Byrne & Nadan, 2011).

Demographic factors: Differences in demographics lead to socio-psychological patterns that can be visible during conflict identity issues between stakeholders. Understanding group demographics allows the practitioner to better analyze the problems and develop interventions (McKay, 2002).

Political factor: Politics has a vital place in conflict (Byrne & Carter, 2002; McKay, 2002). If properly used and delegated, public policy, political institutions, and political authority can carry with them legitimacy. Political forces also affect the distribution of power and decision-making within governments, communities, organizations, or stakeholders in conflict (Byrne & Nadan, 2011). The unequal distribution of power pushes the out-groups within the organizations to the corners of political irrelevancy, proliferating group-to-group conflict (Byrne & Nadan, 2011).

Economic factor: Economic forces can include many issues such as disparity in earnings, institutional favoritism, and lack of funding for necessary resources (Byrne & Carter, 2002; Byrne & Nadan, 2011).A thorough understanding of the economic challenges of the stakeholders can assist in the analysis of the conflict and the peace building processes (McKay, 2002).

Psychocultural factor: Culture is central in the way that individuals, groups, or communities live and interact (McKay, 2002). Cultural differences arise from nationality, ethnicity, and group identity. Group identity assists individuals with defining their own identities and affects self-esteem (Cook-Huffman, 2007). Based on psychocultural factors, groups are viewed as either in-groups or out-groups, which are usually at odds in conflict (Byrne & Nadan, 2011).

Balance of power factor: Power is a key element in conflict theory and perceptions of power are at the heart of conflict analysis (Wilmot & Hocker, 2011). Power and jurisdiction can be used to maintain loyalty of certain communities or groups, while others can be excluded (Byrne & Nadan, 2011). Balance of power issues are relative to the way that power is distributed and used. When one stakeholder has more power than the others, there is an unbalanced power structure and thus an unbalanced conflict (Wilmot & Hocker, 2011).

Methodology

Background for Methods

An investigation of an IAQ complaint was fielded in a command-and-control facility aboard a large military base. The base Inspector General (IG), who received employee reports of mold and other IAQ concerns, delegated the investigation to the base commander (CG). The building employees made similar complaints over two years but perceived an inadequate response. The CG, required to investigate and correct potential problems, delegated the investigation. Due to lack of expertise of personnel within the command elements, the responsibilities to conduct the IAQ investigation were assigned to the IH staff at the medical facility.The IH department was ordered to take the lead on the investigation. The IH staff responded to the reported mold issues in the building, using standard and novel equipment and methods and the investigation, report writing, and remediation took more than three months to complete due to inter-organizational conflict between the stakeholders. Of particular importance were the requirement to hire an independent IH contractor, funding for equipment and training, and participation of non-scientific officials in the post-investigation report review, editing, and approval.

Procedures

A qualitative ethnographic approach was taken in order to perform analytical and observatory research of the IAQ investigation process and interactions.A modified social cubism conflict analysis model was applied to an IAQ mold investigation, identifying and characterizing the issues using the six factors of the social cube. The conflict analysis strategy was used to assess the inter-organizational conflict that existed among the stakeholders. The collected data were tabulated in a custom table to establish the inter-relatedness of the six factors of the social cube as they changed and evolved during the conflict (table 1).

Results

When applied to an IAQ investigation, the social cube's six factors were used to analyze the inter-organizational conflict. The results are exhibited in Table 1. The hindrances to task completion were identified via social cubism. A total of 16 main issues were identified as sources for conflict. Each of the 16 issues was identified with a single main conflict factor and

additional inter-related factors (Table 1). Among the 16 major issues, the distribution of the main and inter-related forces exhibited 14 political, 12 balance-of-power, 15 psychocultural, 13 demographic, nine economic, and seven historical forces.

Discussion

Numerous problems were identified as sources of inter-organizational conflict in an IAQ investigation. The analysis of the conflict using social cubism identified the problems through the six inter-related factors. The analytical strategy was useful as a tool for root-cause analysis for the failure of the IAQ investigation to yield rapid and acceptable outcomes for the potential environmental health threat.

Social Cubism Six Factor Assessment of IAQ Investigation Conflict

Historical: Mold and other indoor air pollutants have been addressed repeatedly in the media, including instances during which members of congress and other government officials have made statements on the topic (Bernstein, Falk, Turner, & Melius, 1984). The scandal at the Walter Reed Army Medical Center in 2007 received considerable media attention and caused public outrage regarding the environmental conditions that wounded and other military employees were subjected to. The media reports showed evidence of IAQ health hazards including mold, rodent droppings, and insects, among others, that were allowed to proliferate in structures with long-term water damage and soiled carpets (Priest & Hall, 2007). These historical forces create a precedent, affording employees in similar working environments to develop their own historical framework that could lead to misunderstanding and mythologizing, which are apparent sources of conflict (Byrne & Nadan, 2011). The historical factor interacted with political, demographic, and psychocultural factors. The second identified problem with historical forces being the main factor is the long-standing IAQ problem with no sufficient resolution provided. The history of the IAQ complaint dated back more than two years. Recommendations were made and some actions taken, but occupants continued to experience symptoms and complain. Health and safety professionals and facilities engineering staff made eleven visits to the building, but the problem was not resolved. The history behind the problem drove employees to file a complaint to the IG, exacerbating the conflict. The history behind a failure to adequately address the complaint interacted with the balance-of-power, political, and economic factors. The decision not to make the recommended costly modifications over the previous two years became visible among stakeholders and the involved organizations became caught in a power struggle regarding duties, responsibilities, and funding for investigation resources.

Political: The delegation of responsibility to conduct the investigation was a political factor in the conflict. Although the base is generally responsible for health and safety of all command elements on the base, the organization is lacking in human resource capabilities. Thus, the performance of the IAQ investigation, including sampling, analysis, and report writing, was redirected to the hospital IH department. The interaction with this issue include balance-of-power, economic, demographic, and psychocultural factors. The nature of military organizations is based on established command and rank structures. The CG, who is the ranking Officer, ordered the subordinate components to conduct the investigation. The distribution of duties within the IH department was affected, depending on level of education and training, expertise, and technical writing ability. The department and directorate budgets were immediately affected by necessary purchase of equipment, sampling media, and lab services. The duties were also taxing on departmental human resources and the ability of the staff to perform the routine workload.The second main political factor was the limitation of adequate IAQ and mold regulatory standards and exposure limits, conclusive research, and response guidelines (Breeding, 2003; Burge, 2004; Hardin, Kelman, & Saxon, 2003; Macher, 1999). However, professional judgment based on scientific data and history is used in these types of assessments. During the investigation, some professional judgments were rejected by authority and questioned by stakeholders.

A lack of established standards can be a vital and controversial topic when economics are concerned (Barrett, 2003; Macher, 1999). Additional inter-related factors included balance-of-power, historical, and psychocultural forces. During the early mold surveys, non-EH personnel in leadership positions made decisions regarding engineering controls, remediation, and risk communication, despite professional recommendations based on sound science and historical precedent. Purchase of new and expensive equipment and training were necessary to meet demands. Leadership ignoring professional recommendations was perceived as devaluation of professional skills and expertise.

Balance of power: The first problem identified primarily as a balance of power factor was the call for inclusion of an independent IH to perform an IAQ assessment. The hospital IH department was seen base leadership as the go-to experts to

thoroughly investigate the IAQ complaint. Nonetheless, base Safety representation also called for the inclusion of a contractor to perform an independent IAQ assessment. The decision to hire a contractor to perform a like study exacerbated the conflict by re-introducing the inter-related economic, political, demographic, and psychocultural forces. Additional funding was required to hire the contractor, thus removing funding from other public health resources. Re-distribution of funds potentially affected completion of routine public health projects. Additionally, hiring an independent IH was perceived by some hospital staff as a loss of confidence in the hospital's EH capabilities, thus exacerbating the psychocultural aspect of the conflict.

The second main problem characterized as a balance of power factor was the involvement of non-scientific personnel in writing and approving the investigation report. The report was based on scientific data collected by professionals. However, during the course of reporting the findings, were injected into the report writing and approval process. Public Affairs Officers (PAO) and Judge Advocate General (JAG) Officers were permitted to influence text changes in the report. Although some changes were made in order to prevent misperceptions of the findings, the report was not approved for dissemination until scientific terms that indicated potential hazards not covered by regulatory standards were removed. Timeliness of the appropriate hazard communication was potentially affected when release of the report was hindered. The inter-related factors included political, demographics, and psychocultural forces. Technically, the excluded information contained data not covered by regulatory standards. The findings of the IH staff were reviewed by professionals who did not fall within the scientific demographic, but did possess knowledge of aspects that are important, though potentially at odds with the professional judgments of EH professionals. Although no codes of ethics covered under certification standards were compromised, perception of such compromise urged some staff to remove their selves from the process. Additionally, inclusion of non-scientific staff in the reporting and communication process devalues the technical knowledge and skill of the EH experts.

Economic: Inadequate resources were the first of the problems identified as an economic factor. In order for EH organizations to perform their duties effectively, a combination of human and material resources and training are vital. In the IAQ investigation, novel instrumentation that was not in the current inventory was necessary for an effective evaluation. The equipment had to be purchased at a cost exceeding $12,000. There is a historic requirement for purchasing of expensive equipment by military organizations and it can be a lengthy process, requiring approval at higher command levels. Balance of power forces interact heavily with economics in these circumstances. Additional training was also required to perform sampling with the equipment. Sampling media and laboratory service funding was also required. Securing funding for purchase of equipment and lab services took nearly two weeks, slowing timeliness of the investigation, report, and hazard abatement. Inter-related factors included balance-of-power, demographics, psychocultural, and historical factors.Staff employed by the base Safety and Environmental departments should have significant training and skills that allow them to respond to complex IAQ problems. However, of the stakeholder organizations involved, only the IH department had adequate knowledge to perform the sampling and analysis. As a result, all of the investigation duties were assigned to the IH department. However, the base did not provide funding for investigation-related costs, including the purchase of equipment, sampling media, laboratory services, and training.The second primarily economic factor was the failure of the base and the hospital to provide adequate funding for the required independent consultant work, although the work was required per base leadership. Adequate funding was not available for the independent performance of an identical assessment compared to IH department analysis. Fewer samples were collected in fewer onsite locations using fewer sampling methods. Inter-related factors included balance of power, political, psychocultural, and demographic forces.

The requirement for an external independent consultant was not contested as a result of power-driven decisions. Although the independent consultant was hired to boost confidence in IH staff capabilities, the inadequate funding prevented an identical study, making it impossible to provide a true comparative assessment between the data collected by both parties. Additionally, hiring the consultant created psychocultural and demographic issues, devaluing the skills, knowledge, and expertise of the IH department staff.

Demographic: Understanding the composition of an organization is key to better analysis of conflicts, and for designing interventions (McKay, 2002). Demographic forces have usually been associated with ethnicity and cultural norms, among other social factors (Byrne & Nadan, 2011; McKay, 2002). Dominant and minority groups can be distinguished based on this

diversity of factors, including education and training, among others. These demographics are closely associated with psychocultural and economic factors within the social cube (Byrne & Nadan, 2011). The first of three demographic forces in the conflict was the differences in the organizational and rank structures of the stakeholders. The demographics of the different commands were vital in the decision-making process regarding the EH investigation. The command structure places base command over all tenant commands. Thus, there is a hesitation to participate in two-way communication due to balance of power and political factors that it interact with the demographics. Within commands, both organizational and individual rank structures affect communication strategies and the manner in which conflict is resolved. The leadership style in military organizations tends to be authoritarian, which can be efficient and productive in the short term, but also ineffective in resolving conflict (Northouse, 2012). When leaders are inflexibly dominant by order of their positions, conflict can escalate and become destructive. The subordinates in the conflict in these situations become the out-group and have a limited influence on decisions (Wilmot & Hocker, 2011). The second demographic consideration was education and training. There exists an education and training disparity between IH department and base staff. In general, the IH staff completed more years of relevant education than base Safety and Environmental staff. Nonetheless, base Safety and Environmental are considered subject matter experts on health and safety issues. The disparity in knowledge leads to differences in opinion and places the organizations at odds. Despite staff education level, the base component has more authority in these situations, creating potential resentment between the groups and escalating psychocultural conflict.

The third demographic force addresses education and training differences within the IH department. Active duty and civil service staff ranks differ based on education and expertise. Some staff members have graduate educations and experience specifically in IH. Some have other public health or EH degrees, while others have considerable training and experience in IAQ issues and have even higher levels of professional academics. Nonetheless, some of the more knowledgeable staff are not department supervisors and have less input into the conflict. Education and training are inter-related with balance of power, political, economic, and psychocultural factors. Economically, funding for an IH exists within the base organizational chart. However, the leadership can and have hired safety professional without IH expertise at a lower pay scale, making the Safety office incapable of handling IH complaints. Additionally, education for safety professionals without relevant academic degrees is expensive. With the federal freeze on travel to professional conferences, the Safety staff is increasingly incapable of responding to IAQ matters. The command and rank structure demographics are also balance of power and political issues that prevent effective communication between the organizations and affect decision-making regarding funding for analysis, thus influencing the ability to perform gold standard sampling methods and potentially affecting hazard communication to the stakeholders. All of these are closely tied to psychocultural issues, which are critical to address in order to resolve conflict (Byrne & Nadan, 2011). Individual and group identity is vital to the self-esteem of the members of the group (Byrne & Nadan, 2011). The demographics of the organizations and the preference given to some elements in the organizations, despite level of knowledge and expertise, affect the psychological and cultural aspects of the groups.

Psychocultural: Numerous psychocultural forces that affect the conflict existed in the investigation. First, Sick Building Syndrome (SBS) diagnosis can be a cause for psychocultural effects. SBS is considered a trivial condition that is mostly psychologically driven and more common where people find themselves in stressful work situations. Some literature reveals an association between poor working relationships and building-related symptoms (Burge, 2004). Nonetheless, a diagnosis of SBS creates conflict because the workers may believe that the employer does not provide a safe and healthy workplace. Despite some evidence, the literature regarding SBS is limited in quantity, and the cause of symptoms is not certain (Burge, 2004; Woods, 1991). However, it is assumed that when no specific etiology is provided, the diagnosis is SBS and that the origin of illness is psychosomatic. However, the lack of exposure limits and standards is driven by a lack of substantial data in research. Additionally, it is known that IAQ issues, particularly those involving indoor mold, can be problematic because of differences in individual immunities and sensitization (Burge, 2004; Marmot et al., 2006; Samimi, 2002; Shufutinsky, 2004). The assumption by leaders that the IAQ complaint must be an indication of SBS, indirectly insinuating malingering as the purpose for complaint, is a psychocultural force that drives the complainant further into an out-group identity. This creates a condition of mistrust for the command and medical organization.

Inter-related factors are political and demographic. No regulatory occupational exposure limits or official sampling and analytical gold standards exist for numerous IAQ pollutants. Nonetheless, SBS has been essentially written off as

psychosomatic. Without laws or specific policies, decisions made by command elements are political and power-driven. This is particularly evident when representatives participating in investigations and remarking about SBS are not in the subject matter expert demographic. The second psychocultural force had to do with employees' perceptions of leadership. After two years of complaining, the employees lost confidence and trust in leadership's ability to resolve the IAQ issues. Employees believed their complaints were inadequately addressed and ignored, and decided to file an official complaint with the IG. Despite IG involvement and a comprehensive investigation, it took too long for results to be reported and remediation to occur. Balance of power and political forces interacted with psychocultural factors, as inadequate response prompted the legal movement of the issue to the IG.

Finally, one intra-organizational psychocultural factor was identified. This psychocultural issue was associated with IH departmental demographics, economics, and politics. In the EH professions, certifications such as the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) and the Certified Industrial Hygienist (CIH) are important tools at assessing competency in practice (American Board of Industrial Hygiene, n.d., Finley & Murphy, 2010; National Environment Health Association, n.d.). Military services provide additional credibility to professionals that have achieved professional certifications, although not required for employment. Credentialed professionals do not receive any additional compensation, but there is an unspoken demographic difference between the staff members within the department that have credentials versus those that do not. Registered staff require annual continuing education units (CEU) to maintain their certifications. Thus, credentialed professionals receive preference for travel and training. This permits credentialed staff to continue to gain more expertise and knowledge, professional credibility, and marketability. Additionally, it is expected that credentialed professionals be assigned as leads in complex situations, such as the IAQ investigation. Credentialed staff members are assigned frequently compared to unregistered staff, allowing them to continue to gain more expertise, thus continuing the cycle. Intra-departmental identity differences have unintentionally created in- and out-groups and have proliferated internal conflict, affecting the entire inter-organizational conflict.

Latent conflict cannot be resolved when the stakeholders in the conflict fail to realize that the conflict exists (McKay, 2002). The inter-organizational conflict in the IAQ study was successfully assessed using social cubism. The IAQ problem was resolved without additional illness or injury, albeit over a lengthy time period.

Conclusions

The ability to recognize and analyze conflicts is critical to the practice of environmental health. Implementation of conflict analysis strategies into comprehensive EH practice has the potential to improve effectiveness and timeliness of surveys and investigations, provide transparent risk communication, perform more timely exposure monitoring, and save on unnecessary expenditures (Shufutinsky, Johnson, & Trojan, 2014). Among conflict analysis strategies, social cubism has been proven as an effective model for use in the real-time analysis and resolution of dynamic conflicts (Byrne & Carter, 2002; Byrne, Carter, & Senehi, 2002; McKay, 2002). A slightly modified social cube was used successfully to identify historical, political, economic, balance of power, psychocultural, and demographic factors in order to get to the root causes of the inter-organizational conflict that transpired in the process of an IAQ investigation aboard a military installation. Although the health issue was resolved, the inter-organizational conflict identified continues to exist with a potential for future escalation.

If applied in real-time, social cubism has the potential to assess conflict as it is happening and changing consistently, playing a critical role in intervention planning and conflict resolution. Conflict analysis models should be implemented into diverse EH programs and incorporated into EH academics. Graduate courses focused on conflict resolution should be included in accredited graduate and other EH training programs.Additional research is needed in the use of conflict analysis and resolution in environmental health and in the potential application of integrative-inductive social cubism (IISC) to environmental health investigations and inspections (Russ-Trent, 2002).

Disclaimer Statement

The findings, interpretations, results, and conclusions of this research are those of the researcher and are not indicative of, supported by, or a representation of the organizations affiliated with the researcher. The United States Navy, Naval Hospital Camp Pendleton, Nova Southeastern University, San Diego State University, or the Academy of Health

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References

Accreditation Board of Engineering and Technology. (2012). ABET Accredited Programs. Retrieved from http://main.abet.org/aps/accreditedprogramsearch.aspx

American Board of Industrial Hygiene. (2013). IH-Defined. In About ABIH. Retrieved from www.abih.org/content/ih-definded

Barrett, J.R. (2003). Mold insurance: Crafting coverage for a spreading problem. Environmental Health Perspectives, 111(2), A100-A103.

Bernstein, R.S., Falk, H., Turner, D.R., &Melius, J.M. (1984). Nonoccupational exposures to indoor air pollutants: A survey of state programs and practices. Public Health Briefs, 74(9), 1020-1023.

Breeding, D.C. (2003). Bioaerosol evaluation in indoor environments.Occupational Health and Safety, 72(5), 58-66.

Burge, P.S. (2004). Sick Building Syndrome.Occupational and Environmental Medicine, 61, 185-190.doi: 10.1136/oem.2003.008813

Byrne, S. & Carter, N. (2002). Social cubism: Six social forces of ethnopolitical conflict in Northern Ireland and Quebec. ILSA Journal of International and Comparative Law, 8, 741-769.

Byrne, S., Carter, N., &Senehi, J. (2002). Social cubism and social conflict: Analysis and resolution. ILSA Journal of International and Comparative Law, 8, 725-739.

Byrne, S. & Nadan, A. (2011). The Social Cube Analytical Model and Protracted Ethnoterritorial Conflicts. In T. Matyok, J. Senehi, & S. Byrne (Eds.), Critical Issues in Peace and Conflict Studies: Theory, Practice, and Pedagogy. New York, NY: Lexington Books

Byrne, S. &Senehi, J. (2007). Conflict Analysis and Resolution as a Multidiscipline: A Work in Progress. In D. J. D Sandole, S. Byrne, I. Sandole-Starote, and J. Senehi (Eds.), Handbook of Conflict Analysis and Resolution.New York, NY: Routledge/Taylor & Francis.

Cook-Huffman, C. (2007).The Role of Identity in Conflict.In D. J. D Sandole, S. Byrne, I. Sandole-Starote, and J. Senehi (Eds.), Handbook of Conflict Analysis and Resolution.New York, NY: Routledge/Taylor & Francis.

Dahl, R. (2003). Finding middle ground: Environmental conflict resolution. Environmental Health Perspectives, 111(12), A60-A652.

Fine, L.G. (2011).The SWOT Analysis: Using Your Strengths to Overcome Weaknesses. Using Opportunities to Overcome Threats. No Location: Kick It, LLC.

Finley, J.S. & Burge, T.J. (2010). An internationally registered environmental health specialist qualification (IREHS).Environment and Health International, 12(2), 34-47.

Fisher, R.J. (2007). Interactive Conflict Resolution: Dialogue, Conflict Analysis, and Problemsolving. In D.J.D Sandole, S. Byrne, I. Sandole-Starote, and J. Senehi (Eds.), Handbook of Conflict Analysis and Resolution. New York, NY: Routledge/Taylor & Francis.

Hardin, B.D., Kelman, B.J., & Saxon, A. (2003). Adverse human health effects associated with molds in the indoor environment. Journal of Occupational and Environmental Medicine, 45(5), 470-478.

Hare, S.M. (2002).Toward a multidimensional model of social interaction as related to conflict resolution theory.ILSA Journal of International and Comparative Law, 8, 803-823.

Kelly, D.L. & Johnson, S.P. (2006). Measurement and Statistical Analysis in CQI. In C.P. McLaughlin & A.D. Kaluzny (Eds.), Continuous Quality Improvement in Health Care: Theory, Implementations, and Applications (3rd ed.). Mississauga, ON: Jones & Bartlett

Kent, B. & Morrow, T. (2012). Nova Southeastern UniversityDHS 8080-1 10004 Course Lecture Presentation. Retrieved from https://mako.nova.edu/webpps/portal/frameset.jsp ?url=%2Fwebapps %2Fblackboard%2execute%2flauncher%3Ftype%Dcourse%26id% 3D65043

Kuhn, D.M. &Ghannoum, M.A. (2003). Indoor mold, toxigenic fungi, and Stachybotryschartarum: Infectious disease perspective. Clinical Microbiology Reviews, 16(1), 144-172.

Macher, J. (1999).Bioaerosols: Assessment and Control (1st ed.). Cincinnati, OH: ACGIH Worldwide Press.

Marmot, A.F., Eley, J., Staffor, M., Stansfeld, S.A., Warwick, E., Marmot, M.G. (2006). Building health: An epidemiological study of "sick building syndrome" in the Whitewall II study. Occupational and Environmental Medicine, 63, 283-289.doi: 10.1136/oem.2005.022889

McKay, J. (2002). The use of social cubism in the analysis of community conflicts.ILSA Journal of International and Comparative Law, 8, 883-896.

Minnesota Department of Health. (n.d.). Fishbone Diagram (Cause and Effect Diagram). In Office of Performance Improvement. Retrieved from www.health.state.mn.us/ divs/sfh/ophp/consultation/qi/resources/tools

National Center for Environmental Health & American Public Health Association. (2001). Environmental Health Competency Project: Recommendations for Core Competencies for Local Environmental Health Practitioners. Washington D. C.

National Environmental Health Association. (2000). Registered Environmental Health Specialist/Registered Sanitarian. In Credentials. Retrieved from www.neha.org/ credentials/index/shtml#rehsrs_cred

National Environmental Health Science & Protection Accreditation Council. (2012). 2011-2012 Update of Accredited Programs.Retrieved from http://www.ehacoffice.org/2012%20 Annual%20Update%20Report-FinalKM2012Diversity_edits(2)pdf

National Institute of Occupational Safety and Health. (2012). Preventing occupational respiratory disease from exposures caused by dampness in office buildings, schools, and other nonindustrial buildings.NIOSH Alert, 2013-102.

Northouse, P.G. (2012). Introduction to Leadership Concepts and Practice (2nd ed.).Thousand Oaks, CA: Sage Publications.

Porter-O'Grady, T. (2004). Constructing a conflict resolution program for health care. Health Care Management Review, 29(4), 278-283.

Priest, D. & Hull, A. (2007).Swift Action Promised at Walter Reed.In The Washington Post.Retrieved from www.washingtonpost.com/wp-dyn/content/article/2007/02/20/AR2007 022001574.html

Ramsay, M.A.E. (2001). Conflict in the health care workplace.BUMC Proceeding, 14, 138-139.

Russ-Trent, L. (2002).Integrative inductive social cubism.ILSA Journal of International and Comparative Law, 8, 771-802.

Samimi, B.S. (2002). Physical and Biological Agents: Recognition, Evaluation, and Assessment. San Diego: Montezuma Publishing.

Shufutinsky, A. (2004). Validation of the Aerotech 6 Single-Stage Microbial Sampler, the SKSC BiostageBioaerosolImpactor, the SKC MicromediaBiostageBioaerosolImpactor, and the Thermo Andersen N6 Single-Stage Viable Impactor in the Collection of Fungal Spores. San Diego, CA: San Diego State University.

Shufutinsky, A., Johnson, W.D. & Trojan, A.P. (2014).The need for inclusion of conflict analysis and resolution training in environmental and occupational health academic program curricula.Environment and Health International, 15(1), 14-33.

Soliman, M.R., Derosa, C.T., Mielke, H.W., &Bota, K. (1993). Hazardous wastes, hazardous materials and environmental health inequity.Toxicology and Industrial Health, 9(5), 901-912.

Stokes, S.C., Hood, D.B., Zokovitch, J., & Close, F.T. (2010). Blueprint for communicating risk and preventing environmental injustice. Journal of Health Care for the Poor and Underserved, 21(1), 35-52.

Strutton, D. &Knouse, S.B. (1997). Resolving conflict through managing relationships in health care institutions. Journal of the Health Care Supervisor, 16(1), 15-28.

Waller, L.A., Louis, T.A., & Carlin, B.P. (1999). Environmental justice and statistical summaries of differences in exposure distributions.Journal of Exposure Analysis and Environmental Epidemiology, 9(1), 56-65.

Wilmot, W.W. &Hocker, J.L. (2011). Interpersonal Conflict (8th ed.). New York, NY: McGraw Hill.

Woods, J.E. (1991). An engineering approach to controlling indoor air quality.Environmental Health Perspectives, 95, 15-21.

World Health Organization. (n.d.). The Department of Public Health and Environment. Retrieved from http://www.who.int/topics/environmental_health/en/

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. Cochrane Database Systematic Review, 8(3), CD000072.doi: 10.1002/14651858.CD000072.pub2

Appendix A

Table 1. Social Cube Factor Interactions: Tabular representation of the factors affecting the IAQ investigation conflict, distributed by the main conflict factors per situation and identifying the additional factors inter-related with each issue.

Main Conflict Factor	**Conflicting Issue/Problem**	**List of Involved Party**	**Inter-related Conflict Factors**
H	(1) Previously existing IAQ complaint & evaluation and assessment in the same building: 2010, 2011	FAC, BSa, MARDIV, BEn, IH-D	E, P, B,
	(2) Mold/IAQ issues in the media over the years, and particularly on military bases such as AMEDD Center & School and Walter Reed Army Medical Center	ASC, GM	P, D, S
B	(3) Call for external independent IH to perform IAQ assessment	CG, CO, DPH	E, P, D, S
	(4) Overall involvement of chain-of-command leadership and non-scientific personnel in scientific evaluation, approval, and writing of report	CG, CO, CGPAO, CGJAG, HPAO, HJAG, BSa	P, D, S
P	(5) Hospital IH Department tasked with the job, including sampling and analysis	CG, CO, DPH	B, E, D, S
	(6) Inadequate IAQ/Mold regulatory standards and exposure limits results in failure to recommend best controls	OSHA, EPA, OPNAV, CG, IH-D	E, B, H, S
D	(7) Differences in rank in base vs. hospital vs. department command structure (hesitation to participate in two-way communication as a result of rank and authority perception (in-group vs. out-group)	CG, CO, DPH, IH-DH, IH-D	B, P, S
	(8) Difference in education and training of base staff vs. hospital IH staff	BSa, BEn, IH-D, OM, MARDIV	P, E, S, H
	(9) Difference in IH and IAQ education and training of IH Department staff	IH-L, IH-SS, IH-JS, Edu, IAQ, Cert	B, S, E
S	(10) The valid existence of Sick Building Syndrome (SBS) and the assumed SBS of all employees by command staff	ASC, Emp/Sup, OHMD	P, D, B
	(11) Lack of Certified Industrial Hygienists, Certified Indoor Environmentalists, or Registered Environmental Health Specialists	IH-D, BSa, BEn	D, P, E

	(12) Cultural differences of employees in BLDG vs. decisions to complain about health issues or fear repercussions	Emp, Sup, FAM, TEN, CAT	D, P, B
	(13) Lack of trust in supervisors, employers, and base leadership	ASC, TCO, BSa, BEn, IH-D	P, B
E	(14) Inadequate equipment, Inadequate training, and Inadequate lab funding	IH-D, DPH, CO, BSa, BEn, NESTC	B, D, H, S
	(15) Inadequate response by Facilities Command to provide repairs, make recommended changes, and to hire contractors for remediation and inspection	FAC, CG, TEN, BSa	B, D, S
	(16) Inadequate consult and order/payment to hired IH contractor to perform valid study/analysis	CG, CO, DPH, IH-D, BSa	D, S, B, P

Conflict Factors Legend

H = Historic E = Economic
B = Balance of Power P = Political
S = Psychocultural D = Demographic

Stakeholder/Involved Party or Activity Legend

FAC = Facilities Engineering Command	BSa = Base Safety
CG = Commanding General	BEn = Base Environmental
CO = Hospital Commanding Officer	DPH = Directorate for Public Health
CGPAO = Base Public Affairs	IH-D = Industrial Hygiene (IH) Department
HPAO = Hospital Public Affairs	IH-L = IH Leadership
CGJAG = Base Judge Advocate General	IH-DH = IH Department Head
HJAG = Hospital Judge Advocate	OPNAV = Office of the CNO
MARDIV = Division Surgeon	OM = Hospital Occupational Medicine Dept
GM = General Media	IH-S = IH Senior Staff
ASC = Affected Staff/Complainant	IH-J = IH Junior Staff
IG = Inspector General	OHMD = Occupational Health Physician
TEN = Tenant and Building Owner/Mgr	Emp = Employer
TCO = Tenant Command Commander	FAM = Family Upbringing
SUP = Supervisor	CAT = Command Climate/Culture
Edu = Level of education (PhD, MPH, BS, etc.)	IAQ = Trained in IAQ Assessment
Cert = Professional certification (CIH, CSP, CHMM, REHS/RS)	
NEST = Navy Environmental and Safety Training Command	

Appendix B

Photographic Representations of the Social Cube and the Six Dynamic Factors of Conflict

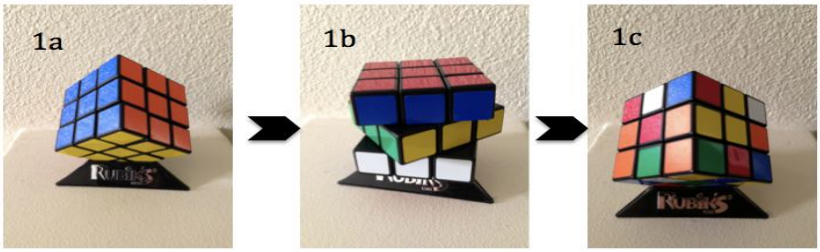

Figure 1: The Rubik's Cube® is a photographic model of the social cube. **1a** represents the six inter-related factors, with each side and color representing an individual factor. **1b** represents the interaction of the six factors. **1c** represents the conflict with all of the six factors involved. Social cubism analyzes these six factors in their dynamic nature in order to resolve the conflict (Byrne & Carter, 2002).