

TRANSFORMING NUCLEAR SAFEGUARDS CULTURE

The IAEA, Iraq, and the Future of Non-Proliferation



TREVOR FINDLAY

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NUCLEAR SAFEGUARDS
CULTURE

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The IAEA, Iraq, and the
Future of Non-Proliferation

Trevor Findlay

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List of Abbreviations

ABACC	Argentine-Brazilian Agency for Accounting and Control
ACDA	U.S. Arms Control and Disarmament Agency
C&S	Containment and Surveillance
CSA	Comprehensive Safeguards Agreement
CTBT	Comprehensive Nuclear Test Ban Treaty
CTBTO	Comprehensive Nuclear Test Ban Treaty Organization
CWC	Chemical Weapons Convention
DDG	IAEA Deputy Director General
DPRK	Democratic People's Republic of Korea (North Korea)
EAEC	European Atomic Energy Community (also EURATOM)
ECOSOC	UN Economic and Social Council
EMIS	Electro-Magnetic Isotope Separation
ESARDA	European Safeguards Research and Development Association
EURATOM	European Atomic Energy Community (also EAEC)
ExPo	IAEA Office of External Relations and Policy Coordination
FAO	UN Food and Agriculture Organization
GAO	U.S. General Accountability (formerly Accounting) Office
HEU	Highly-enriched uranium
IAEC	Iraq Atomic Energy Commission
IAEA	International Atomic Energy Agency
ICAO	International Civil Aviation Organization
ICNND	International Commission on Nuclear Non-Proliferation and Disarmament
IMO	International Maritime Organization
INFCE	International Fuel Cycle Evaluation
INFCIRC	IAEA Information Circular
INMM	Institute of Nuclear Materials Management
INPO	Institute of Nuclear Power Operations
INVO	Iraq Nuclear Verification Office
ISO	International Organization for Standardization
ITU	International Telecommunication Union
JCPOA	Joint Comprehensive Plan of Action
JIU	UN Joint Inspection Unit
kW	Kilowatt/s

kW(th)	Kilowatt/s (thermal)
LEU	Low-enriched uranium
MW	Megawatt/s
MW(th)	Megawatt/s (thermal)
NAM	Non-Aligned Movement
NASA	U.S. National Aeronautics and Space Administration
NEA	OECD Nuclear Energy Agency
NGO	Non-Governmental Organization
NNWS	Non-Nuclear Weapon State/s
NPT	Nuclear Non-Proliferation Treaty
NRC	U.S. Nuclear Regulatory Commission
NTM	National Technical Means
OECD	Organization for Economic Cooperation and Development
OMV	Ongoing Monitoring and Verification (Iraq)
OPCW	Organization for the Prohibition of Chemical Weapons
OTA	U.S. Office of Technical Assessment
QMS	Quality Management System
RSAC	Regional System/s of Accounting and Control
SAC	IAEA Scientific Advisory Committee
SAGSI	IAEA Standing Advisory Group on Safeguards Implementation
SAL	IAEA Safeguards Analytical Laboratory
SEERT	State-Level Effectiveness Evaluation Review Team
SEG	State Evaluation Group
SIPRI	Stockholm International Peace Research Institute
SIR	Safeguards Implementation Report
SLA	State-Level Approach
SLC	State-Level Concept
SQP	Small Quantities Protocol
SSAC	State System/s of Accounting for and Control of Nuclear Material
TC	Technical Cooperation (IAEA)
UNAEC	UN Atomic Energy Commission
UNESCO	UN Educational, Scientific and Cultural Organization
UNMOVIC	UN Monitoring, Verification and Inspection Commission
UNSC	UN Security Council
UNSCOM	UN Special Commission
UNSCR	UN Security Council Resolution
VCDNP	Vienna Center for Disarmament and Non-Proliferation
VERTIC	Verification Research, Training and Information Center

VIC	Vienna International Center
WiN	Women in Nuclear
WINS	World Institute for Nuclear Security
WMD	Weapon/s of Mass Destruction

Preface

THIS STUDY IS a product of the Project on Managing the Atom (MTA) at the Belfer Center for Science and International Affairs at Harvard University. The research was funded by the Carnegie Corporation of New York. The project was stimulated by the growing international interest in nuclear safety and security cultures and the likelihood that similar cultural concepts could also be applied to nuclear safeguards. It was also prompted by reports that the International Atomic Energy Agency (IAEA) had sought to change its safeguards culture after the Iraqi non-compliance case of the early 1990s revealed the shortcomings of its safeguards system.

I began research for this project by reviewing the general literature on organizational culture and consulting management theory experts. Professor John Carroll, Morris A. Adelman Professor of Management at the Massachusetts Institute of Technology's Sloan School of Management, was of great assistance in helping me understand the finer points of organizational culture theory. I then conducted archival and current documentary research on the origins of IAEA safeguards culture and its evolution since the Iraq case. One challenge in pursuing such research is that the IAEA Secretariat does not publicly report to its member states the details of its organizational, management, or personnel changes.¹ This secrecy extends even to its archives. Unlike other organizations in the UN system, the IAEA will only release documents after thirty years, rather than the standard twenty years elsewhere at the United Nations, and even then the Agency insists that certain documents remain classified indefinitely.² The analysis in this book is necessarily hampered by such constraints.

I have addressed the lack of official documentation on organizational change within the IAEA through interviews and email correspondence with current and former IAEA staff, including inspectors and safeguards experts; officials of IAEA member states; and academic and government researchers. Official interviews with current staff were difficult to arrange at IAEA headquarters. Instead, it was necessary to conduct them off-site, at conferences or in informal meetings. In addition, I drew on the invaluable oral history interviews of IAEA safeguards staff conducted by the Pacific Northwest Nuclear Laboratory (PNNL) from 2005 to 2009 and by Elisabeth Roehrlich for the IAEA History Project at the University of Vienna from 2015 to 2016. I also

scoured published materials—personal reminiscences and memoirs—of former Directors General and other IAEA officials for cultural stories and references. My research was further supplemented by a workshop on safeguards culture convened by MTA at Harvard in May 2014, which involved former IAEA officials and academics.

I presented a preliminary version of the study at the IAEA's International Safeguards Symposium in Vienna in October 2014. I received comments both during the formal session and afterward. Furthermore, I attended and interviewed participants at workshops and conferences held by the IAEA and the Institute of Nuclear Materials Management (INMM). Such events, in addition to being devoted to policy and technical issues, are also jamborees for the nuclear community and are thus culturally revealing. I also had access to papers presented at workshops on safeguards culture convened by the INMM and the European Safeguards Research and Development Association (ESARDA) in 2005 in Santa Fe, New Mexico and by the INMM at Texas A&M University in April 2016.

One of the ways in which organizational culture can be investigated—often used by management consultants—is to conduct a formal survey and systematic interviews of an organization's personnel. This method was not possible at the IAEA due to the then-management's constraints on transparency and openness, an unfortunate hallmark of the organization's culture. In any case, formal surveys do not necessarily reveal the deepest aspects of culture, as respondents are not always willing to be frank about their true beliefs.

Due to such constraints, much of the evidence for this study is therefore unavoidably anecdotal rather than based on systematic collection of data. Moreover, given the sensitivities associated with revealing information about organizational culture, most of those who were interviewed or provided comments for this book prefer anonymity. The 2014 Harvard workshop was run according to Chatham House rules, according to which comments may not be attributed to individuals without permission. I am grateful to all my interlocutors for their frank insights and willingness to humor me with my probing and sometimes uncomfortable questions.

I am thankful for the enthusiastic assistance of the staff of the IAEA Archives, especially director Leopold Kammerhofer and Marta Riess, despite the constraints under which they operate. In addition, I am grateful to those who read the manuscript, in whole or in part, for their insightful comments and suggestions; among them were Matthew Bunn, John Carlson, Jim Casterton, Vilmos Cserveny, Olli Heinonen, Shirley Johnson, Robert Kelley, Martin

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MTA Research Assistant Brett Cox conducted a valuable literature search on safeguards culture, while Katie Miller, Josh Anderson, and Casey Campbell provided critical production support. My partner Christopher Reberger assisted at crucial moments with IT and graphics. Beth Clevenger and Anthony Zannino at the MIT Press were model collaborators in ushering the book into print. Above all, I am thankful to my editors at the Belfer Center, Morgan Kaplan and Karen Motley, for their moral and editorial support in getting a book to publication during a global pandemic. I am eternally grateful to Karen for her superb editorial skills and Herculean efforts in the final sprint to publication.

Naturally, notwithstanding the assistance I have received, I am completely responsible for the content of this book.

This study is dedicated to my friend, the late Dimitri Perricos (1936–2016), a legendary IAEA inspector who, as a cultural skeptic, introduced me to the term “candy concept.”

Trevor Findlay
Melbourne, January 2022

Introduction

IN MAY 1991, following Iraq's defeat in the Gulf War, inspectors from the International Atomic Energy Agency (IAEA) entered Iraq to conduct inspections of the country's nuclear facilities. They were astonished to discover that for years, Iraq had been violating its international commitment not to acquire nuclear weapons. The Iraqis had assembled a substantial nuclear weapons infrastructure "over the berm" from the peaceful nuclear facilities and materials that had been declared to the Agency and which had been subject to IAEA nuclear safeguards. Not only did Iraq have a substantial secret nuclear weapons program hidden beyond the view of IAEA inspectors, but it had also successfully misled inspectors about the purposes of its declared nuclear activities.¹ Saddam Hussein's regime had come closer to acquiring nuclear weapons than anyone, including the IAEA itself, had imagined.

Iraq was among the first countries to join the IAEA, and one of the first to sign and ratify the 1968 Nuclear Non-Proliferation Treaty (NPT) and a comprehensive safeguards agreement (CSA). Iraq also became the first country to confront the Agency with a major safeguards violation.² The apparent ease with which it fooled the Agency meant that the credibility of the entire safeguards system was at stake. The then-Director General of the IAEA, Hans Blix, said that the revelations "shook the world."³ Critics accused the IAEA Secretariat of being "complacent and unobservant."⁴ Veteran IAEA official David Fischer lamented at the time that "the IAEA was seen by many as having failed its (presumably) first diversion detection test; it has patently been unable to detect a large and longstanding undeclared programme. Without the Gulf War, the IAEA may not have discovered the programme until the Iraqi Government openly demonstrated that it had acquired the bomb."⁵ He records in his official history of the Agency that the Iraq case "demonstrated serious defects in the system."⁶

How did this happen? How did the international organization charged with detecting non-compliance with the NPT fail to discover Iraq's clandestine weapons program, which had been planned since 1972, pursued in research and development mode until 1988, and then visibly ramped up into large-scale facility construction for three years prior to 1991? With almost half a century of experience with safeguards, how was it that the IAEA failed to detect a nuclear weapons program located in plain sight of its inspectors? Why had they chosen not to look and inquire? Wasn't the whole point of nuclear safeguards that violations be detected early enough for the

international community to act? Long before the Iraq case, safeguards expert Paul Szasz explained that:

It hardly seems conceivable that even a large State could maintain entirely separate two massive nuclear cycles, one open and controlled and the other secret—keeping in mind that the frequent presence of inspectors in the country and their contacts with many persons dealing with nuclear matters would mean that even in the most repressed society rumors and news of the construction of large “secret” facilities would reach the Agency long before these became operational.⁷

Mohamed ElBaradei, IAEA Director General from 1997 to 2009, himself asked: “Why had the IAEA not challenged the Iraqis on the incompleteness of their declarations? Why had there been no calls for special inspections? How could the IAEA have ‘missed’ Iraq’s broader nuclear ambitions?”⁸

This book seeks to answer such questions by considering the possible role of the IAEA’s organizational culture, especially its safeguards culture. While there is no agreed definition of an ideal IAEA nuclear safeguards culture, as there is for both nuclear safety and nuclear security, I draw on those models to propose such a definition as: “That assembly of characteristics, attitudes, and behavior, exhibited by the Agency’s personnel, which supports and enhances effective and efficient nuclear safeguards as a vital contribution to the non-proliferation of nuclear weapons and international peace and security.”⁹

In the decades after the inception of safeguards in the late 1950s, safeguards culture had become cautious, process-driven rather than goal-oriented, and complacent about potential non-compliance. It had drifted away from the original goal of deterring states’ clandestine acquisition of nuclear weapons by detecting any illicit acquisition of nuclear materials. Rather, it became entirely focused on nuclear material and facilities declared by states, while ignoring the possibility that they might fail to declare everything that they possessed.

Organizational theorists, especially those concerned with investigating major accidents, have increasingly come to use three broad “lenses” or perspectives to analyze organizational success and failure: the institutional, the political, and the cultural.¹⁰ Each lens magnifies a stereotype that is never found in pure form in real life, but which nonetheless provides useful analytical insights into what drives organizations. As John Carroll argues, “By using all the lenses to analyze an organization or problem, we gain new insights and a richer understanding of organizational dynamics and human behavior within organizations.”¹¹

First, there is the institutional perspective, which Carroll calls the strategic design lens; it portrays organizations as “a kind of machine” that can be rationally designed for optimal performance. As Carroll notes, “People, money, equipment, and information are assigned using logical principles of efficiency and effectiveness to achieve organizational goals.”¹² In this case, Carroll says, “action comes about through planning.”¹³

This model, applied to the IAEA, would assume that the original negotiators of the IAEA’s safeguards system strove for maximum effectiveness and efficiency and that the organizational design reflects these aspirations. As implementation of the system proceeded, the Board of Governors and the Secretariat would make decisions designed to maximize the operation of the system and ensure that it evolved optimally. Problems with safeguards can, this perspective holds, be fixed with better planning, management, administration, and resources.

One hears this view, naturally, from IAEA managers, who explain that if only they are given the right tools, they could do the job more effectively. Management consultants and some critics contend that the IAEA is unable to meet the challenge of implementing safeguards principally because of its management and administrative flaws. Both characteristics, in this view, derive from the Agency being a United Nations–type institution, rather than from any inherent deficit in safeguards as negotiated. This perspective, while clearly of some merit, is nonetheless inadequate in entirely explaining organizational behavior. Organizational theorists such as John Child bemoan the fact that “most of the literature on organizational design treats it as a purely technical matter, a question of adjusting structure to suit prevailing contingencies.”¹⁴

Second, there is the political lens. In contrast to the institutional or strategic design lens, the political lens assumes that “everything is political,” or at least that most important decisions are driven by politics. It is the quest for power, rather than rational analysis, that has the greatest effect on organizational performance. As Carroll, citing Jeffrey Pfeffer, puts it, “The political lens views the organization as a contested struggle for power (the ability to get things done) among stakeholders with different goals and underlying interests.”¹⁵ Action in this case comes through jockeying for power and negotiations between various interest groups. One hears this perspective on the IAEA most vividly, often expressed cynically, from diplomats accredited to the Agency. But it also dominates the views of some Agency employees and some external observers, especially the media.

The governance of international organizations such as the IAEA is arguably particularly prone to political machinations. Unlike entities such as

corporations, which are driven principally by profit-maximization goals that management, boards of directors, and shareholders have in common, international organizations have as their principal stakeholders their member states, which often have widely differing opinions on their goals for and expectations of the organization. Unlike the shareholders of corporations, the stakeholders of international organizations themselves provide the management, funding, and staffing, creating multiple opportunities for political maneuvering and intrusion. Member state involvement can range from strong support for an organization's declared goals and mission at one end of the spectrum (such as Western support for safeguards) to efforts to hobble the organization's ambitions at the other (as India, Iran, Iraq, Pakistan, and Russia have all attempted to do in the case of IAEA safeguards).

Explanations by political scientists and international relations scholars of the behavior of international organizations thus emphasize the pivotal role of international politics.¹⁶ Oran Young writes of the United Nations that "it does not operate above the hurley-burley of power politics. . . . The states which engage in power politics are its constituent units, and the problems generated by power politics constitute its reason for being."¹⁷ Global affairs theorists highlight an eternal struggle between states' desire for international organizations to assist them in meeting collective challenges that they cannot meet individually, on the one hand, and their desire to preserve their national sovereignty, power, and prerogatives on the other. As Ian Hurd notes, "The tension between state obligations and state sovereignty provides the fuel that drives world politics in and around international organizations."¹⁸ This struggle affects the IAEA's ability to detect and deal with violations of safeguards by limiting the capabilities of its verification system and constraining its continuing operation and enhancement. Problems faced by the safeguards system, the political perspective assumes, can only be solved by negotiations between states.

Third, there is culture theory, which, in contrast to the other two approaches, contends that the key to organizational dysfunction is often found in the values, norms, perceptions, attitudes, and resulting behavior of those who work in the organization, rather than in flaws in the formal structures and processes or in political machinations. Organizational behavior, viewed through this lens, often reflects implicit or even unconscious understandings of "the way we do things around here," rather than formal job descriptions or the official line about how things are done. The cultural approach focuses on how organizations find solutions to the challenges they face by institutionalizing "rules, rituals and values of the group."¹⁹ From a cultural perspective, action

comes through habit and routine.²⁰ In the formation of culture, political and institutional arrangements develop routine and unmindful behavior going beyond the original intent. In investigating culture, the most revealing comments often come from rank-and-file employees when explaining how they do their jobs day-to-day—in contrast to their job description and how management envisages those jobs being done pursuant to political or strategic planning decisions. A key insight of the cultural perspective is that decisions made for political and institutional reasons may be absorbed, shaped, distorted, ignored, or resisted by an organization's culture. Despite the best efforts of political and institutional forces, culture may prevail. A cultural perspective presumes that there is something ineffable in organizational behavior that is not reducible to factors such as material interests or power. As renowned organizational theorist Peter Drucker reportedly famously said, "culture eats strategy for breakfast."²¹

This study does not assume that culture explains all or even most organizational behavior. Rather, it accepts that culture is a useful lens through which organizations may be viewed to gain greater insights into why they operate the way they do. Exploration of the IAEA's organizational culture, especially its safeguards culture, will be used to supplement the standard explanations of the Iraqi non-compliance case—the political and the institutional—and to address nagging suspicions that they do not tell the whole story.

How could it be, for instance, that no one at the IAEA, whose main business is to worry about nuclear weapons proliferation, was sufficiently concerned to blow the whistle on Iraq? Why were disquieting media reports and the concerns of some member states not taken more seriously, prompting a review of the Agency's information? After all, Iraq was not a standard case; its nuclear research reactor, which it had claimed was for peaceful purposes, had been bombed by Israel in 1981 on the suspicion that it was part of a nuclear weapons program. There were clearly some aspects of Iraq's declared nuclear activities that did not make sense in terms of a standard peaceful research agenda, an issue that bothered both French and Italian technology suppliers. Was the organizational culture of the IAEA Secretariat, which had had almost half a century to gestate, blind to the type of non-compliance pathway taken by Iraq? Did IAEA member states, which are responsible for the Agency's governance, imbibe the same safeguards culture as the Agency's Secretariat, or did they help to create it? Even after the IAEA gained unprecedented access to Iraq in 1991 and began to uncover evidence of Iraq's non-compliance, why was the Agency reluctant to accept what it was finding? And why did the Agency, after Iraq's transgressions were revealed, initially begin reapplying its

standard safeguards approach when it was clear that something more ambitious was required?

Was this case like the 1986 *Challenger* space shuttle disaster, which was allegedly spawned by the National Aeronautical and Space Administration's cultural "normalization of deviance"?²² Or was it more like a "normal accident," such as the 2011 Fukushima nuclear power plant disaster, involving systems so complex that they are bound to fail sooner or later because human beings cannot conceptualize all the potential pathways to failure?²³ In the Iraq case, the IAEA safeguards system had some of the qualities of "an accident waiting to happen," because it dealt with the proliferation of complex technologies and failed to take account of all potential pathways to non-compliance. The question for this study is how much of this may be attributed to culture.

The principal motivation for this book is to help ensure that the cultural perspective is taken into account as continued efforts are made to strengthen IAEA nuclear safeguards. Understanding of and attention to organizational cultures in the fields of nuclear safety (prevention of nuclear accidents) and nuclear security (prevention of nuclear terrorism) are well advanced compared to that of nuclear safeguards culture, partly because the chain of events that produces the greatest threats are more imaginable.²⁴ This study addresses this lacuna; I consider these differences in more detail in Chapter 3. This book does not consider the national safeguards cultures of IAEA member states, except where they have contributed significantly to the Agency's safeguards culture (which is true of the United States and some other Western states). National safeguards culture has been analyzed extensively by others.²⁵ In fact, when most safeguards experts discuss safeguards culture, they are invariably referring to national safeguards cultures, not that of the IAEA. Furthermore, this volume does not examine in detail the safeguards culture of the two regional safeguards organizations, the European Atomic Energy Community (EAEC), also known as EURATOM, and the Argentine-Brazilian Agency for Accounting and Control (ABACC), except where they may have contributed to IAEA safeguards culture. This does not imply that these are unimportant regimes, but they pale in comparison to the size and complexity of the IAEA system and its foundational and transformative role in safeguards culture globally.

Unlike nuclear safety and nuclear security, where the state is held to be principally responsible, it is the IAEA that is primarily accountable for applying nuclear safeguards to states. It is the Agency alone that negotiates safeguards agreements with each state, establishes the appropriate safeguards regimes, conducts inspections, assesses a state's compliance with its

obligations, and reports serious non-compliance to the UN Security Council. If safeguards fail, it is the Agency, rightly or wrongly, that is blamed. In fact, one of the assumptions of the IAEA's safeguards culture is that the credibility, professionalism, and technical competence of the IAEA's safeguards performance should be the gold standard for states and regional organizations to emulate in fulfilling their respective safeguards obligations.

In light of these considerations, the purpose of this study is to:

- discern what the IAEA's organizational culture, particularly its safeguards culture, can tell us about the failure of safeguards in the Iraq case, in a way that usefully supplements the traditional explanations;
- explore the challenges that the Iraq case posed to the then-prevailing IAEA's safeguards culture;
- examine whether a new safeguards culture has embedded itself at the Agency since the Iraq case along with the considerable strengthening of the safeguards system overall; and
- suggest how the Agency might deal with safeguards culture in the future.

In the first chapter of this volume, I analyze the IAEA nuclear safeguards system, the Iraqi nuclear program, and the way in which safeguards were applied to that program before 1991. In Chapter 2, I discuss the standard political and organizational explanations for why the IAEA missed evidence of illicit Iraqi nuclear weapons activity. In Chapter 3, I investigate the explanatory power of the cultural approach to the Iraq safeguards puzzle and explain how it complements the standard approaches. In the fourth chapter, I probe the culture shock experienced by the IAEA and its safeguards system as a result of its failure in the Iraqi case. In Chapter 5, I consider the state of IAEA safeguards today and measures that should be taken to cultivate an optimal safeguards culture. In my conclusion in Chapter 6, I argue that, alongside the standard political and organizational factors, culture played a discernible role in the IAEA's failure to detect Iraqi non-compliance in the several years prior to 1991. I conclude that as a result of the culture shock experienced by the Agency, a new safeguards culture has arisen since the Iraq case, though this was not due to a deliberate, systematic strategy of cultural change. Safeguards culture remains largely unexamined and, among some IAEA officials, dismissed as irrelevant. I recommend that the IAEA regularly assess the state of its safeguards culture using widely accepted techniques, and incorporate its findings into its strategic planning and organizational change strategies.

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