

Standards Tailoring Code of Conduct

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Executive Summary

The tailoring of compliance documents in the acquisition of space systems is often controversial and drawn-out. Traditional approaches to standards tailoring rely on customer and contractor subject matter experts (SMEs) coming to agreement on the adaptation of multiple government and voluntary consensus standards to a particular mission, a process that is typically costly, time consuming, and challenging. While there is significant guidance on tailoring missions by risk class, there is little guidance on the actual process of tailoring. This document lays out a “code of conduct” for standards tailoring that aims to reduce the time, cost, and challenges of standards tailoring. Specifically, we recommend that:

1. Standards tailoring is conducted by a small defined team of representatives from all stakeholder communities applicable to the phase of the mission.
2. The team is led by the individual with final approval authority for standards tailoring or their delegate. In limited cases, there may be co-chairs, but it is strongly recommended that there be no more than three co-chairs.
3. Participants understand the risk posture of the mission and its cost and schedule constraints and align their expectations accordingly.
4. Participants understand that the goal is consensus, not unanimity, and that no single member of the team holds veto power other than the chair or co-chairs. Any impasse will be resolved by the chair.
5. Participants come to consensus on an end date for the standards tailoring effort and on the form of the final standards tailoring product (the document that will describe the agreements that result).
6. Participants explicitly define which standards will be imposed in their entirety and which will be tailored. Standards not explicitly imposed in full or in part will be considered not applicable to the mission.
7. Participants define the meaning of such terms as “meets the intent” and explicitly describe the implementation and validation artifacts required. Similarly, participants come to consensus on the level of detail required for any evaluation, trade study, report, or other deliverable intended to show adherence to a standard.
8. Participants conduct the standards tailoring process in accordance with the principles of just culture, bounded timeline, open communication, and appropriate scope, as described in section 3, Philosophy and Principles.
9. Participants document all tailoring and all agreements in the formal deliverable defined at the beginning of the tailoring effort.
10. Participants define what happens if the standards tailoring needs to be changed in the future.

This code of conduct is the result of a consensus among SMEs from both customer and contractor organizations who are well acquainted with the difficulty of standards tailoring. Incorporating this code of conduct with existing standards and tailoring guidance can create a more positive and professional environment for success.

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1. Introduction

1.1 Purpose

The selection and tailoring of compliance documents in the acquisition of space systems is often one of the more controversial and drawn-out processes in early program formulation and execution. While there exists guidance on tailoring by mission risk class [1]–[5], few guidance documents talk about the process of tailoring. Traditional approaches rely on government and contractor subject matter experts (SMEs) coming to agreement on the tailoring of multiple government and voluntary consensus standards, a process that is typically costly, time consuming and challenging.

Consider this example of the scope of the problem. *Test Requirements for Launch, Upper-Stage, and Space Vehicles* (Aerospace Report No. TR-RS-2014-00016, aka SMC-S-016) is 145 pages long and contains 788 “shall” statements [6]. A contractor SME who diligently pores over 788 shall statements post-award, trying to edit them down to something that better fits the program, presents a tailored version of the standard to the customer and the customer’s technical advisors. After a sometimes lengthy period of review, the tailoring is redlined, and discussions ensue. Often there are disconnects between the customer’s and the contractor’s interpretations of the risk posture, cost, and performance requirements of the mission, as well as the role of standards in ensuring mission success. These disconnects become entrenched, and the process continues over a period of weeks to months for up to dozens of standards on some contracts, with thousands of “shall” statements being debated passionately by both sides. Technical advisors are reluctant to deviate from tried-and-true practices. Contractors feel that their efforts to meet the intent of standards tailoring is itself increasing costs and causing delays. Customers face cost and schedule impacts and possibly even program cancellation. Without the highest-level stakeholders from all three organizations (customer, technical advisor, and contractor) agreeing on ground rules, assumptions, risk posture, and a method of resolving impasse, the exercise may never produce the desired product.

To respond to this ongoing need for guidance, a team of SMEs from several national security space companies and customer communities was formed to develop a framework for improving the tailoring process. After a literature review and a brainstorming exercise, the team concluded that the process could be improved by developing a “code of conduct” for standards tailoring—a set of guiderails and best practices to keep tailoring discussions focused and effective.

1.2 Background

Space missions are often categorized by a mission risk class, as described in *Risk Classification for NASA Payloads* (NASA NPR 8705.4), *Mission Assurance Guidelines for Mission Risk Classes and Do No Harm (DNH) for Space Vehicles* (Aerospace Report No. ATR-2023-01889), *Mission Risk Planning and Acquisition Tailoring Guidelines for National Security Space Vehicles* (Aerospace Report No. TOR-2011(8591)-5), and other such documents (see the list of references). These class categories have generalized standards and expectations appropriate to the risk posture of a project. They are not intended, however, to specifically define all that can and should be done to ensure success of a project. No standard can accommodate every possible set of circumstances nor provide every possible contingency for successful project execution. Rather, they are intended to permit appropriate tailoring to the needs of the project.

Standards are typically based on established best practices and proven methodologies. However, as the space enterprise evolves and new technologies emerge, standards do not always keep pace. Tailoring standards allows for the recognition of new paradigms (such as proliferated constellations and the use of COTS parts [7]), enabling industries to embrace new methods while still maintaining an appropriate level of quality and safety.

The purpose of tailoring standards is to adapt or customize established guidelines, rules, or specifications to suit the specific mission. Tailoring standards has similar benefits to tailoring clothing: it provides a better “fit” for the program and allows engineers to apply good engineering judgment instead of relying on one-size-fits-all checklists. It helps programs balance cost and risk, but, more importantly, it frees up resources to focus on those aspects of the program that most need attention or that can most impact mission success. In some cases, it even helps the program to succeed by preventing overtest [8] or by ensuring testing is targeted to specific mission risks.

1.3 Applicability

The degree to which tailoring makes sense depends on a variety of factors. Specific mission definitions, budget and schedule limits, technological readiness, contract incentives, and risk tolerance might all affect the decision to tailor standards. Programs designed for any mission class can benefit from tailoring standards, but in many ways, programs choosing to accept higher risk tolerance may benefit more from tailoring, as doing so better defines what risks a customer is or is not willing to take. Tailoring is a balance between the effort to determine a specific means of implementing a standard’s intent and the benefit and savings provided by not following the standard more generally.

Teams embarking on a standards-tailoring effort are advised to first review ATR-2023-01889, which provides a top-level outline of typical mission risk postures and the mission assurance approaches associated with each. Additionally, teams are encouraged to review existing guidance on what standards are generally applicable to specialty engineering disciplines and subsystems at all levels of risk posture, such as those found in *Adaptive Mission Assurance Strategy for Pre-Acquisition* (Aerospace Report No. TOR-2019-01781-Rev A) or similar document. This should form the “first pass” of the tailoring effort, before additional refinement is attempted, in accordance with this code of conduct. A solid understanding among all stakeholders of the mission objectives and risk posture, plus an initial gross tailoring of compliance documents, will save a lot of time in the tailoring process.

1.4 Outline

In this document, we first offer a brief discussion of the acquisition timeline and the best opportunities to conduct standards tailoring within that timeline. After that, we describe the philosophy of standards tailoring and establish a code of conduct that will promote a professional and positive environment for the collaborative tailoring process. We then present a list of best practices to be applied to different types of tailoring efforts to ensure future tailoring exercises are executed as efficiently as possible. In the appendices, we provide definitions, a description of typical roles and responsibilities in the tailoring process, and guidelines for resolving an impasse.

2. Standards Tailoring as Part of the Acquisition Process

Standards tailoring is typically a component of a larger acquisition process. Customer agencies have their own acquisition approaches, but most will map to the generic model shown in Figure 1.

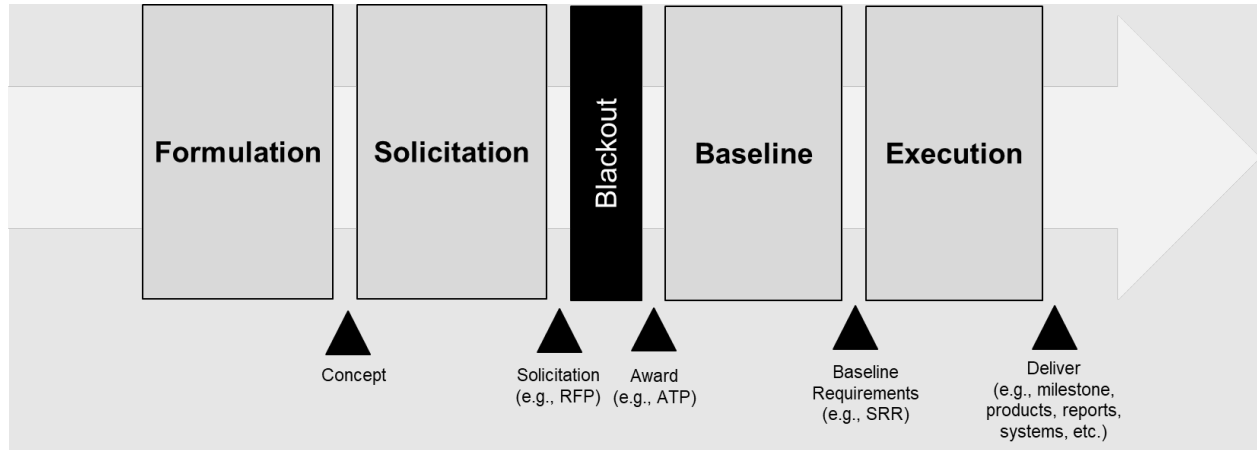


Figure 1. Generalized mission phases.

The acquisition process begins with program formulation and concept development. This is followed by solicitation development, with the aim of developing a request for proposal (RFP) or other formal solicitation to which contractors or other agencies may respond with proposals. The time from official solicitation release to contract award is considered a blackout period wherein activity and communications are significantly limited to ensure fairness to all respondents. Once awarded, requirements are further defined and baselined and then design and development activities begin. Programs may compress the phases, conduct the phases within a spiral development cycle, or follow some other approach; all should still benefit from the guidance provided in this document.

During formulation, the initial mission class of the program is usually defined. Sometimes the mission class is defined by internal regulations, like for Department of Defense (DOD) Acquisition Category (ACAT) 1 or ACAT 2 programs [8], and sometimes the mission class is determined through a more informal process. During this process, programs usually use the terminology in ATR-2023-01889, NPR 8705.4A, or some other similar guidance document to communicate program risk posture and make initial decisions on the applicable standards.

During the development of a solicitation, stakeholders conduct tailoring by identifying a set of industry standards, guidance, and other compliance documents to add to the contractual documents to flow to bidders. Sometimes stakeholders determine that the standards will be flowed in their entirety, and sometimes stakeholders will tailor the standards themselves, indicating which parts of the standard are mandatory and which parts are not applicable.

Once a solicitation is released, the blackout period begins, and discussions are tightly controlled. Nonetheless, in some solicitations, there is room for discussion between the customer and the bidders on standards tailoring and the role of contractor command media, best practices, and alternative design approaches to best satisfy the cost, schedule, and performance goals of the mission. The use of requests for information (RFIs), study contracts, and other mechanisms by which feedback from proposers is sought can facilitate this process.

Often, this pre-solicitation standards tailoring process is not completed or must be refined after contract award. When this process occurs after contract award, an undefined scope of potential additional work is transferred to the contract. This can lead to significant cost and schedule overruns as the activity to tailor

these standards is performed in parallel with the nominal program execution activities. Depending on the timing of these findings, all levels of program deliverables could be impacted. For example, if a contractor has written a procurement specification and begun the procurement of an item to meet the known requirements and then the tailoring activity changes requirements, the contractor and supplier may incur additional cost or schedule. Possible mitigations for this type of cost and schedule growth are to award multiple contracts for preliminary design review (PDR), critical design review (CDR), and production and allow tailoring to continue as the design matures prior to production. The risks posed by entering into contractual agreements without predefined standards are also mitigated by following the guidance in this document.

Regardless of the time period in which standards tailoring is accomplished, the later sections of this document provide guidance to help the process move forward as efficiently and effectively as possible.

3. Philosophy and Principles

Regardless of when the standards tailoring process occurs, it is critical to break some of the mindsets that tend to dominate the process. Before describing the code of conduct, we outline the philosophy that underlies successful standards tailoring efforts. We suggest that programs that are actively pursuing specific tailoring of standards adhere to the following principles when doing so.

3.1 Just Culture

The concept of “just culture” comes from aviation and healthcare mishap investigations and can be summed up by the statement that “no one comes to work to do a bad job” [9]. Organizations may have different perspectives, but at the end of the day, government program offices, direct support contractors, federally funded research and development centers (FFRDCs), SMEs, contractors, and contractor teams all want the same thing: a mission that is successful at a mutually acceptable risk posture and an affordable price for both sides. No one benefits from program failure, and no one benefits from program cancellation due to cost or schedule overruns. Teams engaging in standards tailoring must agree to approach the tailoring process in good faith, acknowledging that all participants are invested in the success of the mission. This sets the cornerstone of trust for trades and decisions to come.

3.2 Bounded Timeline

Standards tailoring should be run like a small and lean program within a program. Tailoring efforts should have their own agreed-upon budget and schedule, with clear decision points and deadlines. Ideally, teams should agree that once tailoring is complete, it will not be revisited without good reason, and any requests for changes will be handled through official engineering change request or waiver processes. At a minimum, teams should come to an agreement on who has the authority to reopen the discussion on standards tailoring and under what (strictly limited) circumstances that would be allowed.

3.3 Open Communication

Clear, direct communication is critical for effective standards tailoring. Programs should strive for peer-to-peer discussions between engineers and SMEs wherever possible, with minimal limitations, go-betweens, or layers of bureaucracy. Customers should know their true risk posture and be realistic about the resources required to achieve it, understanding that low risk always comes at a higher cost. Similarly, contractors should be as transparent as possible with their command media and internal processes, as well as their internal challenges. If NDAs are required, they should be put in place expeditiously and extended to anyone participating in the tailoring process. All participants should strive for openness and authenticity.

3.4 Appropriate Scope

In general, mission assurance should be “tailored up” from the minimum acceptable risk class and associated recommendations outlined in documents such as ATR-2023-01889 and NASA NPR 8705.4A, rather than tailored back from maximum (i.e., “Class A”) assurance recommendations. In determining what risk class is “minimally acceptable,” customers should consider all aspects of a program—technical, cost, and schedule—recognizing that a less risk-tolerant mission typically comes with higher costs. Customers should deliberately select and flow down only those standards and requirements which are applicable to the item being procured within the context of mission needs. Customers should explicitly identify which standards are open to tailoring and to what degree [10]. Similarly, where evaluation is required to justify the tailoring of a requirement, customers should be clear about what does and does not constitute an appropriate evaluation. The onus is on the customer to communicate what they are asking for and why.

4. Standards Tailoring Code of Conduct

There are many ways to conduct a standards-tailoring effort, but regardless of the exact process, the following code of conduct should apply:

1. Standards tailoring is conducted by a small defined team of representatives from all stakeholder communities applicable to the phase of the mission.

All stakeholders should be represented, but not maximally so; there should not be more than two or three representatives from each community lest the team become too large to be efficient. Participants in the standards tailoring team should at a minimum include the customer, the customer's technical advisors, and the contractor. For very large projects, consider subdividing teams by discipline or by standard, and using reachback where needed. The team should understand and define, if necessary, the roles, responsibilities, authorities, and expectations of its members up front. Appendix B provides some definitions of the roles and responsibilities involved. In some cases (pre-RFP and pre-award), inclusion of contractor personnel may not be legally permissible. In these cases, the goal of the team is an explicit definition of the standards imposed, tailored or otherwise, consistent with the mission's risk posture and budget and sufficient to provide a development contractor a solid basis for developing a bid.

2. The team is led by the individual with final approval authority for standards tailoring or their delegate. In limited cases, there may be co-chairs, but it is strongly recommended that there be no more than three co-chairs.

A single decisionmaker acting as the designated decision authority avoids paralysis by committee. In cases where the team is led by co-chairs, the co-chairs must commit to working together to achieve consensus among themselves. An ideal person to lead the standards-tailoring team would be the customer program's chief engineer, risk manager, or similar individual, with the approval of the program manager. The approval authority (or authorities) must represent both the technical and programmatic considerations of the mission or project; a single, purely technical lead is discouraged.

3. Participants understand the risk posture of the mission and its cost and schedule constraints and align their expectations accordingly.

Participants should not seek "Class A" levels of assurance at "Class D" level of effort. Participants should also understand how flexible the mission is to adjusting cost, schedule, and risk posture and be on the lookout for any mismatch between technical (performance) expectations and programmatic (cost and schedule) expectations. An in-person program "off-site" conducted up front (and repeated periodically as necessary) is recommended to set and maintain a common understanding of these factors.

4. Participants understand that the goal is consensus, not unanimity, and that no single member of the team holds veto power other than the chair. Any impasse will be resolved by the chair.

Appendix C outlines methods for resolving an impasse. The chair may, at their discretion, elevate cases of impasse to a more senior decisionmaker in program leadership. This is at the discretion of the chair alone; however, others on the team should not "appeal to a higher authority" except in rare cases of extreme concern that warrant the intervention of very senior leaders. The goal is not to suppress debate or the raising of legitimate concerns; rather, the goal is for the team to "dissent and decide" in a timely manner, without every decision being re-litigated at a higher level.

5. Participants come to consensus on an end date for the standards tailoring effort and on the form of the final standards tailoring product (the document that will describe the agreements that result).

This consensus should also include identifying who is primarily responsible for documenting the resulting agreements. To support the timely transition to mission execution, the team should prioritize meeting the end date over perfect consensus or process.

6. Participants explicitly define which standards will be imposed in their entirety and which will be tailored. Standards not explicitly imposed in full or in part will be considered not applicable to the mission.

Contractors and developers may independently decide to conform to standards that were not imposed by the customer; these standards would be considered applicable to the mission, just not as conformance requirements under the contract [11].

7. Participants define the meaning of such terms as “meets the intent” and explicitly describe the implementation and validation artifacts required. Similarly, participants come to consensus on the level of detail required for any evaluation, trade study, report, or other deliverable intended to show adherence to or compliance with a standard.

Contractors can demonstrate compliance with a standard or tailored standard in a number of ways, from a simple assertion that their processes meet the intent of a standard all the way up to a line-by-line comparison of command media to the standard. It is critically important for all parties to understand the level of detail or analysis required to show adherence to requirements. That level of detail should be commensurate with the chosen mission risk class and resources available—a line-by-line comparison is likely not feasible for a program with limited budget and schedule. In instances where finer detailed comparisons are not feasible, clear contractual language should indicate who the authority is for determining that an artifact “meets the intent” of a standard.

8. Participants conduct the standards-tailoring process in accordance with the principles of just culture, bounded timeline, open communication, and appropriate scope, as described in section 3, Philosophy and Principles.
9. Participants document all tailoring and all agreements in the formal deliverable defined at the beginning of the tailoring effort.
10. Participants define what happens if the standards tailoring needs to be changed in the future.

In a perfect world, tailoring would be complete at the end of the process, and changes would be discouraged. In the real world, that is rarely the case. Changes should be discouraged post-award, but if needed, should ultimately be prosecuted through formal contractor engineering review boards (with associated contractual changes) if the request is from the customer, through formal waiver requests if the request is from the contractor, or through similar formal change management processes as appropriate to the mission.

5. Standards Tailoring Code of Conduct

There are many ways to conduct standards tailoring. Rather than providing a step-by-step process, which would invariably not apply to every situation, this section will outline some examples of how to apply the code of conduct to different phases of mission acquisition. Figure 2 shows a rough mapping of subsections to mission phases.

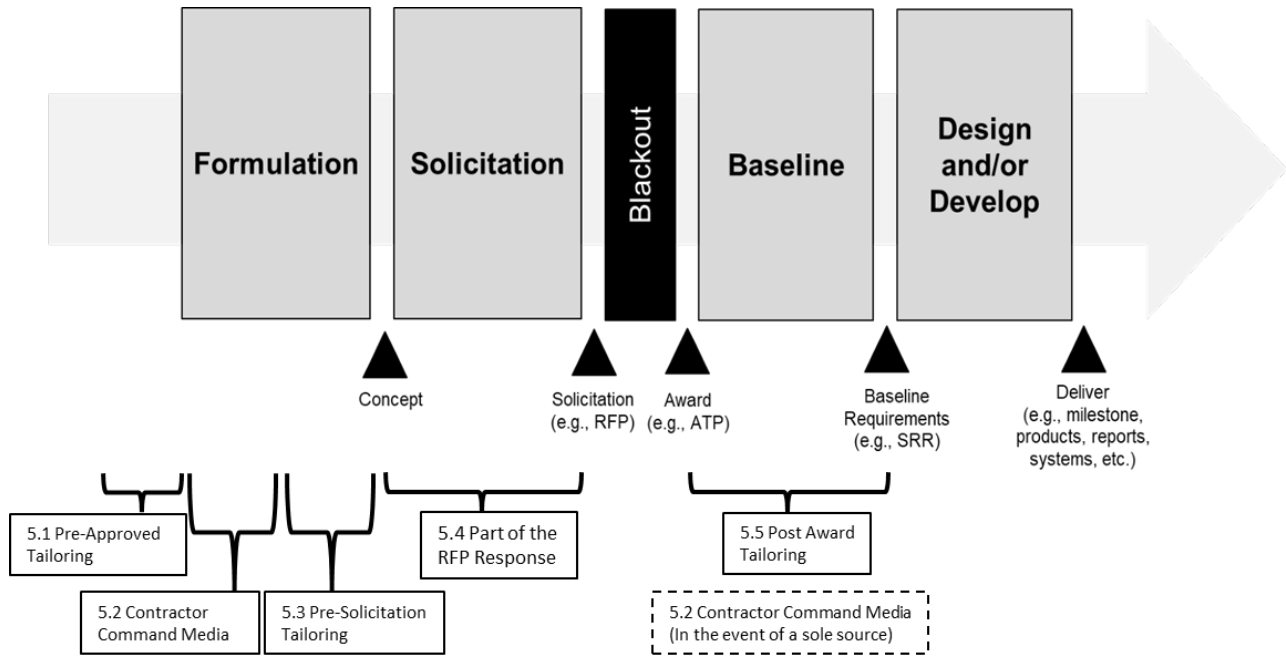


Figure 2. Applicability of guidance to mission phases.

5.1 Pre-Approved Standards Tailoring by Contractor or Risk Class

An organization might use the code of conduct to develop pre-approved levels of tailoring by mission class. ATR-2023-01889, *Mission Assurance Guidelines for A-D Mission Risk Classes* (Aerospace Report No. TOR-2011(8591)-21), NPR 8705.4A, and several other reference documents [3][5] provide general guidance on such tailoring. Some organizations have gone further and established specific guidance for their programs [13]. Note that in situations where every mission is different, these pre-established tailorings might themselves be subject to further tailoring, during which the code of conduct should apply.

In some circumstances, organizations might recommend specific standards tailoring for certain contractors. A customer might note that across its development portfolio, contractor A always asks for a particular tailoring of a test approach or standard since that tailoring is consistent with their assurance plan and command media. The customer could convene a team in accordance with the code of conduct that examines the difference between the standards usually imposed on contractors within its portfolio and contractor A's command media and create a pre-approved tailored standard for contractor A that applies to all missions within its portfolio. Teams should always work closely with their contracting officer to ensure that this process does not undermine fair and equal competition. The goal in conducting this sort of tailoring is to avoid re-litigating already-approved tailoring for new programs and to take advantage of the past history of success. Ideally, the customer would do this for all contractors, document the results in accordance with tenet #9 of the code of conduct (document agreements in a formal deliverable), and share that across its portfolio and with other agencies, who could choose to adopt the pre-approved tailoring for all similar programs.

Another approach is for customers to perform audits of contractors and pre-vet a contractor's command media for acceptability in lieu of a particular standard. This is similar to how some agencies and contractors vet suppliers, creating a "trusted supplier" list or "industry leading parts manufacturer" designation [14], or how some industry-wide standards (such as AS9100) are audited. Once established, this designation would simplify the standards flow-down process. Customers would have to determine the details of how such compliance would be reviewed and renewed, however, whether as part of an independent industry audit or as part of a customer's quality processes.

5.2 Accepting a Contractor's Command Media

Customers are often reluctant to use a contractor's command media in lieu of standards, in part due to their lack of familiarity with the command media and in part because gaining the required insight can be time-consuming and difficult. Yet there are many benefits to using a contractor's command media: it encourages consistency and repeatability in the contractor's process, which results in higher quality; it saves time and energy that could be better focused on producing a product that meets the customer's requirements; it reduces the technical risk associated with changing a proven process; and it saves money by avoiding the need for costly changes to a contractor's standard document formats, test equipment, or processes. It also frees up SMEs to focus on other aspects of mission success.

Facilitating the use of contractor command media requires strict attention to the principles of open communication and appropriate scope. We recommend the following process be followed, in accordance with the code of conduct:

1. The customer and the customer's technical advisors agree on a specific list of mission assurance topics that are of utmost importance to the success of the mission (e.g., mass properties; parts, materials, and processes; software; structural verification). This list is then delivered to the contractor.
2. The contractor maps their command-media process documents to the list of topics and provides this documentation to the customer.
3. The customer and the customer's technical advisors review the documentation and adjudicate it, bearing in mind the principle of appropriate scope and keeping the program's objectives and constraints in mind.
4. The customer discusses concerns with the contractor and the contractor's process owner. This is best done in person to enable a free flow of information. The philosophies of just culture and open communication apply, as do the tenets #3 (understand the risk posture), #4 (aim for consensus, not unanimity), and #7 (define what is needed to meet the intent of a standard) of the code of conduct. This method, combined with continual access, mitigates any worry of an expedited (rushed) review.
5. The customer approves the contractor-mapped command media as is or with the agreed-upon additions or exceptions.

Some other things to consider during this process include whether the contractor has already successfully built and flown missions using this command media, whether it has been assessed for equivalency in the past and if that assessment is current, whether an assessment performed in the past can be leveraged, whether the contractor can demonstrate stable process control (e.g., AS9100 certification), and whether the command media gets flowed down to subcontractors [13].

Optionally, contractor command-media adjudication may be performed during the baseline phase of mission execution in the event of a sole-source procurement or contract.

5.3 Pre-Solicitation Tailoring

Where possible, we recommend that the customer engage in a thoughtful examination of program context and a thorough scrub of applicable standards before developing the final RFP or contract solicitation. The goal of this process is to come to a consensus on which standards, tailored or otherwise, may provide beneficial guidance and context. The details should be sufficient to allow the contractor to understand how their established processes can be best used or adjusted to meet the needs of the proposed mission [15][16]. During this period of time, the philosophy and code of conduct should govern the customer's process.

During pre-solicitation tailoring, the customer generally owns the process. The exit criteria should be a defined RFP that flows down standards initially as guidance only in accordance with Federal Acquisition Regulation (FAR) Part 11.002(c). Customers should make use of data accession lists and request access to data rather than specifying specific contract data requirements in terms of contract data requirements lists (CDRLs) with specific formats.

One challenge in pre-solicitation tailoring is getting the feedback of potential bidders, who might have alternative mission assurance approaches to suggest. If possible, the customer should consider obtaining feedback from potential bidders through study contracts, RFIs, or other mechanisms [15]. Regardless of the availability of such feedback, the customer can improve execution efficiency and reduce risk by clearly and concretely defining its success criteria, risk posture, cost and schedule constraints, and the feasibility of trades between these mission characteristics. Customers should identify and resolve mismatches between risk posture, contractual requirements, and funding and ensure realism in their expectations. The result should be a set of requirements that can be well articulated by the customer in an RFP, so that the bidder community can understand and provide a response to all requirements.

5.4 Tailoring as Part of an RFP and Response

In some cases, the customer might decide to provide guidelines in the RFP or other contractual solicitation mechanism and allow the contractor to respond with its proposed tailoring. In these cases, we recommend that the customer decide on mission objectives and priorities [17] in as much detail as possible and determine an initial risk posture [1][3]. The customer should also assess whether the competitive-range cost and schedule are reasonable and compatible with the desired risk posture. The customer then includes this information in the bidder's library to provide bidders with guidance as to which level of tailoring is acceptable.

The customer might include language similar to the following in the RFP in order to solicit responses from the contractors on the level of mission assurance and standard adherence offered:

The Offeror shall describe the mission assurance approach and Offeror's quality systems. The Offeror should include a discussion of relevant standards and certifications. In particular, the Buyer is interested in how the Offeror plans to assess, mitigate, and communicate residual risk to the customer for the duration of the program to meet the performance and availability requirements within the cost and schedule constraints described elsewhere in this RFP.

The contractor then submits proposed tailoring and command media along with the RFP response. The customer evaluates the proposed tailoring along with the other factors in making its source-selection decisions.

During RFP and response, the customer controls the process, but the contractor has the responsibility to define an approach that is within the risk profile of the customer. Accordingly, evaluation criteria may include how the contractor plans to comply with the contractual requirements, what gaps or noncompliance issues they have identified, and how they plan to manage risk within the parameters of the solicitation. The

customer must evaluate tailoring as part of the proposal and either accept a contractor's proposal or provide feedback to the offeror. Ultimately, the customer may need to include a post-award process to reconcile any remaining tailoring with the successful offeror(s).

5.5 Post-Award Tailoring

Post-award tailoring of standards is not ideal, since the customer and contractor have already agreed to binding terms for the execution of the mission, and changes to these terms may require changes to the contract. It is in these cases that the code of conduct must be strictly followed and the tenets outlined in section 3 adhered to. In particular, a post-award tailoring should have a schedule and budget, as described in section 3.2, and as outlined in tenet #5 (come to consensus on an end date). It should also have a final decision authority and a process for documenting and formalizing the agreements reached in the tailoring effort, in accordance with tenets #2 (the role of the chair) and #9 (document agreements in a formal deliverable). If possible, the work breakdown structure of the contract should be adjusted to include this tailoring activity.

Ideally, the post-award standards tailoring process is conducted mainly to clarify all stakeholders' understanding of the tailored standards list that has already been formally agreed to. Any substantive changes to tailoring at this point should be governed through formal contractual processes (e.g., change control board, engineering change proposal, waiver request). Since a contractual relationship exists and a product and price have been agreed upon, such changes have cost, schedule, and performance implications that must be reflected in the contract. As mentioned earlier, some possible mitigations for this type of cost and schedule growth are to award multiple contracts for milestones such as PDR, CDR, and entry to production to allow tailoring to continue as the design matures prior to production.

6. Conclusion

It is the opinion of the authors that organizations adopting this code of conduct with its philosophy, principles, tenets, and suggested applications, will decrease frustration, better resolve controversy, and expedite the drawn-out processes that are all too often a part of standards tailoring. This approach represents a consensus of SMEs spanning both customer and contractor organizations who are well acquainted with both sides of the issue. Teams that implement the philosophies of just culture, bounded timelines, and open communication; set appropriate scope; and adopt the 10 heuristics described herein will go far in clearing the common obstacles to success. For additional guidance and context, the authors have provided a set of appendices that outline definitions (Appendix A), roles and responsibilities (Appendix B), and guidelines for resolving an impasse (Appendix C).

This code of conduct is intended for incorporation with existing standards and tailoring guidance to create a more positive and professional environment of collaboration. It also offers guidance on the application of the approach and best practices mapped to a generic acquisition timeline to enable more effective and efficient standards tailoring.

By capturing these philosophies and heuristics and by outlining their application, we hope to provide a means for continuous improvement going forward. As such, it is the desire of this team of authors to routinely improve upon this code of conduct based on practice and experience.

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Appendix A. Definitions

This section provides suggested definitions on terms related to standards tailoring that are frequently nebulous and often lead to disagreement. They are not meant to be all-encompassing. Refer to the Federal Acquisitions Regulations and Defense Acquisition University for additional definitions [18][19]. These definitions are also presented with U.S. government acquisitions in mind, though nothing precludes their use in other acquisitions.

Standard: According to the International Standard Organization, a standard is “a document established by a consensus of SMEs and approved by a recognized body that provides guidance on the design, use or performance of materials, products, processes, services, systems or persons.” It “provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.” It represents the “distilled wisdom of people with expertise in their subject matter and who know the needs of the organizations they represent – people such as manufacturers, sellers, buyers, customers, trade associations, users or regulators” [20].

In the context of space acquisitions, we find that the term “standard” can be used broadly to mean many different things; therefore, we suggest the following additional terms to help provide more context to standards tailoring efforts:

Interoperability standards: Standards that define form, fit, and function or otherwise specify an interface between two elements of a system or system of systems. Such standards are usually developed to improve modularity and to ensure functionality and are often not subject to tailoring except under specific engineering circumstances. Examples include the National Security Space Launch Standard Interface Specification, the Air Force Satellite Control Network Standard Interface Specification, and other such specifications that define interfaces. They are generally referred to as “specifications” rather than “standards” and may have been adopted by voluntary consensus but are not generally voluntary in their implementation.

Regulatory standards: Standards that specify a minimum acceptable level of quality, testing, safety, or compliance, without which the system will not be approved for development, launch, or deployment. Similar to building codes, such standards lay out the requirements for certification or approval and are often not subject to tailoring without an associated loss of that certification or approval. Examples include the Orbital Debris Mitigation Standard Practices, frequency licensing requirements, Underwriters Laboratories certification, electrical codes, and so forth.

Voluntary consensus standards: Technical documents, such as test methods, specifications, and terminology, that are developed or adopted by voluntary consensus standard bodies using procedures that have safeguards to ensure that the standards development process is open to all interested parties and that all input and viewpoints are considered and treated fairly. Voluntary consensus standard bodies are generally private sector, not-for-profit entities such as organizations, associations, or technical societies [21]. Some voluntary consensus standards are adopted into regulatory standards. For example, AS5553, *Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition*, has moved from a voluntary consensus standard to regulatory requirement.

Mission assurance standards: In the context of space missions, these are standards drawn from historical experience and lessons learned that provide best practices for maximizing mission success. They focus on the “how” rather than the “what” and are generally promulgated by the government rather than by an independent private-sector standards body. These are the standards most often identified for tailoring. There can be gray areas between mission assurance standards and regulatory standards, and this can be a source of disagreement during standards-tailoring efforts. In general, if a certification is not granted by adherence to a standard, then that standard is more likely to be a mission assurance standard than a regulatory standard.

Examples include TR-RS-2014-00016 (aka SMC-S-016); MIL-HDBK-217, *Reliability Prediction of Electronic Equipment*; MIL-STD-461, *Electromagnetic Interference Characteristics Requirements for Equipment*; and other government standards.

Meets the intent: For the purposes of standards tailoring, an approach that “meets the intent” of a standard or requirement is one that achieves the desired outcome of the standard or requirement, though not necessarily in the way defined by the standard or requirement. In other words, an approach meets the intent if it meets the “what,” if not the “how,” of a requirement. Early in the course of standards-tailoring activities, program stakeholders must come to agreement on what specific actions or artifacts are required to prove an approach meets the intent of a standard and distinguish between when a simple assertion is sufficient and when more detailed analysis is required. See the definition for “evaluation required.”

Evaluation required: In the context of standards tailoring, “evaluation required” generally means that a specific element of a standard can be waived if an appropriate justification is given for why the requirement is not applicable or why the intent of the requirement is met through other means. Early in the course of standards-tailoring activities, program stakeholders must come to agreement on what specific actions or artifacts constitute an “evaluation” and which stakeholders have the final approval authority on that evaluation. In general, programs with lower risk tolerance will require a more rigorous evaluation, whereas programs with higher risk tolerance may accept a contractor’s internal evaluation or assertion or a simple justification statement.

Tailoring acceptable: When used in contractual language, “tailoring acceptable” means that some subset of a standard’s requirements or “shall” statements are not required for customer acceptance of the final product. Use of the term “tailoring acceptable” generally requires the customer to specify which parts of a standard are open for discussion and tailoring and which parts of a standard are not negotiable.

Conformance: Conformance generally means applying and satisfying the conditions of a standard. Standards often have normative clauses (needed to claim conformance) and informative clauses (information or guidance on application or implementation). Well-written standards will define allowable tailoring of normative clauses as well as what comprises recognized levels of conformance or conformance classes. However, many standards are not so explicit. There can be several levels of conformance:

- Full conformance: Occurs when an entity implements all the normative clauses of a standard.
- Minimal conformance: Occurs when an entity implements the minimum elements of the normative clauses of a standard that allow a claim of conformance.
- Tailored conformance: An intermediate level of conformance somewhere between minimal and full conformance, as defined by tailoring statements.

Appendix B. Functions and Responsibilities

To promote efficient tailoring, clear roles and responsibilities should be defined. While it is expected that one solution will not fit all tailoring situations, this section attempts to define the core roles and responsibilities that should enable successful tailoring with minimal overhead.

Government

Government roles can vary:

- Program/project management
- Mission management
- Developers (as in the case of NASA centers)

Contractor

Contractor roles can vary:

- Support to program/project management
- Support to mission management
- Developers, including subcontractors

Tailoring manager

The tailoring manager acts as a single coordinator for the tailoring process, whether tailoring is being performed at a program, project, or component level. Tailoring is a process of negotiation between stakeholders; therefore, this role requires an individual with skills in communication, documentation, and integration. The tailoring manager does not need to be an expert in the subject matter specifically being tailored (e.g., be a security professional when tailoring security requirements). Instead, the tailoring manager should be a generalist who understands how the requirements, policies, and standards being tailored fit into the program or project and who can identify appropriate stakeholders for specialist-level topics. The tailoring manager coordinates, but they are not in themselves an approver.

Designated decision authority

The designated decision authority holds authority over the ultimate application of the tailored requirements and is commonly a program or project manager. This individual has a direct stake in the overall impact of the requirements, standards, or policies being levied, specifically in terms of cost, schedule, and technical risk impacts. The designated decision authority will provide the final approval of the tailored product. While it is expected that most tailored products will remain static after their initial approval, any deviations to the agreed-upon tailoring or changes to the tailoring itself after initial approval shall be ultimately reviewed by the designated decision authority under the processes appropriate for the stage of the mission (e.g., change control board, waiver board). The designated decision authority should be defined in the program or project management plan or equivalent document, and it is possible the designated authority role could be fulfilled by different stakeholders within a program or project office over the lifecycle of a project. For example, during pre-formulation, a project's designated decision authority may be the program manager but then might transfer to the project manager upon formulation or project approval.

During the tailoring of individual requirements, the designated decision authority may act as a tie-breaker for situations where other stakeholders are not able to agree upon the tailored content for a given requirement.

Requirement owner

The requirement owner is the individual from an organization who functionally owns the requirement, standard, or policy being considered for tailoring and who will be responsible for the acceptance of the verification artifacts provided against the requirement, standard, or policy. For example, a range safety requirement owner may be the range safety officer. A quality assurance standard may be owned by a professional society or organization but may be functionally verified by a quality assurance manager within a program. There may be multiple requirement owners for a given requirement, standard, or policy being tailored although tailoring managers should work to identify the party with primary responsibility and determine when someone is a requirement owner (i.e., they have approval authority for the functional application of the requirement) versus a SME who has an opinion, but no approval authority for the functional application of a requirement. For example, on an engineering program, the chief engineer or lead systems engineer may be considered the ultimate requirement owner within a program, in addition to the functional owner of a given requirement.

Internal stakeholders

Internal stakeholders include the parties being impacted by a requirement, standard, or policy and who may have requested the tailoring take place. They also include parties affected by tailoring that has been requested by another. There may be more than one internal stakeholder. Internal stakeholders provide tailoring approval or rejection recommendations to the requirements owners, unlike a SME who provides technical inputs but does not have a vote in the approval or rejection process.

SMEs

SMEs are individuals with expertise applicable to the tailoring discussion (they have an opinion about tailoring) and have been brought in by the tailoring manager to assist in the development of a tailored requirement or to provide inputs on the technical impact or rationale of a given requirement or proposed tailoring.

Appendix C. Resolution of an Impasse

Any standards-tailoring effort can result in strong feelings, and any time individuals with strong feelings attempt to come to consensus, there can be an impasse. Even if all individuals involved in a tailoring effort agree to the philosophy outlined in this document and abide by the principles listed in the code of conduct, an impasse can occur. Resolving an impasse when dealing with multiple competing priorities during compliance-document tailoring requires a careful and collaborative approach. Below is a step-by-step process to help address the situation.

1. Identify the priorities: Ensure that all stakeholders involved clearly understand and agree on the competing priorities, including programmatic priorities such as cost and schedule. This step is crucial because sometimes an impasse arises due to miscommunication or differing interpretations of priorities.
2. Collect data and information: Gather relevant data, information, and evidence to support each priority. This may involve reviewing regulations, policies, industry standards, and any other relevant documentation that can provide insights into the implications and importance of each priority. While it is important to be as thorough as possible, individuals should recognize that timeliness is critical and should not get stuck in the information-gathering phase.
3. Establish decision criteria: Work together with the stakeholders to define objective decision criteria that will be used to evaluate each priority. These criteria should be measurable, specific, and aligned with the overall compliance goals.
4. Engage in constructive dialogue: Facilitate open and respectful discussions among the stakeholders. Encourage each party to express their concerns, perspectives, and reasons for prioritizing their respective requirements. Again, the goal is to dissent and decide, not to engage in endless debate.
5. Identify common ground: Look for areas of overlap or common ground between the priorities. Sometimes there might be opportunities for compromise or solutions that can address multiple concerns simultaneously.
6. Seek expert advice: If necessary, consult with compliance or legal experts or industry specialists who can provide unbiased insights and recommendations based on their expertise.
7. Evaluate impact and risk: Assess the potential impact and risk associated with each priority. Consider the consequences of not addressing certain requirements and weigh them against the benefits of fulfilling others.
8. Explore alternatives: Brainstorm alternative approaches or modifications to the compliance document that may satisfy the competing priorities more effectively.
9. Build consensus: Strive for consensus rather than simply voting or choosing the majority decision. Consensus-building ensures that all stakeholders are fully on board with the final resolution and minimizes potential conflicts down the line. Even if consensus is not possible, ensure all dissenting voices are heard. However, do not get bogged down. Ultimately, the goal is a decision, not perfect consensus.
10. Document the decisionmaking process: Keep detailed records of the discussions, evaluations, and decisions made during the resolution process. This documentation will help provide transparency and accountability for the choices made.

11. Implement and monitor: Once a decision has been reached, implement the changes to the compliance document and closely monitor its effects. Regularly assess the impact of the decision on compliance and adjust as needed.
12. Learn from the experience: After resolving the impasse, hold a post-mortem or lessons-learned session to identify what worked well and what could be improved in the decisionmaking process for future situations.

Standards Tailoring Code of Conduct

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