



Peter J. Denning

DOI:10.1145/2043174.2043188

## The Profession of IT

# The Grounding Practice

*The skill of making and recognizing grounded claims is essential for professional practice. Getting objective data to support your conclusions is not enough.*

**I**N MY WORK, I constantly have to assess whether claims are valid. This applies not only to my own claims, but to the claims of others that I am considering as evidence to support my claims or to launch actions.

The problem of validating claims seems to be growing in recent years. Google searches yield many exaggerated claims that are not useful as evidence. Many apparently independent news items all derive from a single source, such as a press release, whose accuracy cannot be verified. Even the crowdsourced Wikipedia can be untrustworthy. How do we recognize or generate valid claims in this environment?

Some Web services already offer help with the quality of evidence. Reputation.com, a for-profit, locates derogatory information about its clients and tries to neutralize it or cut off the sources. Snopes.com investigates urban myths and other hot “memes” and rates them according to whether they can be independently verified. Truth-Seal.org vets and guarantees claims, and pays bounties to those who successfully refute them. Idoscience.org helps kids doing science experiments obtain data to sustain or refute their science claims.

For our daily work we need not Web services, but practices that enable us to generate valid claims and recognize when others’ claims are valid. One commonly recommended practice toward this goal is to “base decisions on data”—meaning per-



form experiments to back up your hypotheses before asking others to act on them. Another is the agile developer mantra to “fail fast and often”—meaning organize your project so that you only move forward with components that pass quick field tests. As useful as these practices are, they do not directly address the formation of valid and compelling claims. Bad decisions based on (insufficient) data, and failures that teach us nothing, are all too common.

Let us examine the deeper structure of valid claims. We will see a practice called “grounding claims” that consistently produces them.

### The Deep Structure of Many Professional Claims

A *claim* is a statement that asserts something is true. A *grounded claim* is

a claim accompanied by sufficient, relevant supporting evidence.

If you reflect for a moment on claims you have heard, you will see that most claims are actually subjective. They are hypotheses, judgments, evaluations, or opinions that something is true. That is why supporting evidence is so important. Good evidence makes the claim credible to listeners and makes it easy for them to accept. The evidence can be either facts or opinions, or a mixture of the two:

- ▶ *Objective evidence* consists of facts. Facts are statements generally accepted as true. Facts can be independently re-verified or possibly falsified.

- ▶ *Subjective evidence* consists of opinions. Opinions are evaluations, judgments, or assessments. Whether we accept an opinion as supportive of a claim depends on how much we trust the opinion maker.

Evidence is sufficient if it deals with all the objections listeners are likely to have. Evidence is relevant if it supports the claim and omitting it would weaken the claim. In the next sections, I will give examples of objective grounding from science and subjective grounding from team-member selection.

The preceding structural description is not sufficient to guarantee that listeners will actually accept a claim. Various other factors influence listeners, including:

- ▶ *Plausibility*—does the claim make sense?
- ▶ *Balance*—does the evidence deal with competing or opposing claims?
- ▶ *Commitment*—does the speaker

defend the claim and deal with its consequences?

Sometimes, even the speaker's comportment will affect listeners' willingness to accept your claim.

Often unconsciously, we rely on these distinctions in our daily work. As professionals, we size up a client's problem and claim whether or not we can help. As managers, we evaluate alternative means to get projects done and claim the least expensive or fastest one. As leaders, we try to mobilize people to take care of a concern by claiming a path of acceptable risk. Everywhere we turn, we are making or hearing claims, and we base our actions on them.

Note that there are many other forms of argument and rhetoric than the type being considering here. In the sciences and professions, we want to persuade based on evidence. That is the sole focus of this column.

### Objective Grounding

Some professions such as science, engineering, and medicine have strong traditions of grounding their claims. In science someone who makes a new claim (hypothesis) is expected to support the claim with data, logic, and other evidence that will allow others to accept the claim. The peer review process for publication tries to evaluate whether claims are well grounded, and seeks to reject papers whose claims are not.

In these professions a claim evolves from the status of hypothesis to fact over a period of time. Initially, a hypothesis will have few followers. Over time, it will gain allies as others test and confirm it for themselves. Eventually, when it is universally accepted and no one can find contrary evidence, the hypothesis will be accepted as a fact by the community. Even so, scientific facts are subject to refutation later if new evidence turns up, for example, new data from more precise instruments. This is why science sociologist Bruno Latour says that science is a process of constructing facts.<sup>4</sup>

In its investigation of the space shuttle Challenger disaster on a cold morning in January 1986, the Rogers Commission debated without resolution the hypothesis that O-ring failure was the cause. Physicist Richard Feynman confirmed it dramatically with a

## Everywhere we turn, we are making or hearing claims, and we base our actions on them.

public experiment showing that the O-ring material became hard and brittle in a glass of ice water. His simple demonstration instantly pushed the claim over a threshold of credibility. The commission concluded that although the data was available it had not been presented in a compelling way to NASA managers determined to launch. Although the potential for a well-grounded claim was there, the NASA managers did not "hear" the engineers' actual claims as well grounded. The commission also concluded the NASA managers were not open that morning to any claim that launching was too dangerous.

In the early 1900s, U.S. Navy Lieutenant William Sims observed that British ships whose gunners used hand cranks to dynamically adjust the angle of cannons had much higher hit rates during battle.<sup>1</sup> He measured the British hit rate around 10% and the U.S. rate less than 1%. He advocated to the U.S. Navy that continuous-aim gunnery would turn more battles to U.S. wins. Navy officials ignored Sims's initial technical reports. He wrote more reports, offering more data; they continued to ignore him. He became very critical of their attitude. They saw him as an egotistical crank. Eventually he decided his career was tanked and wrote a complaint directly to his Commander-in-Chief, President Theodore Roosevelt. Lucky for him, Roosevelt thought his claim had merit and brought him to Washington to oversee Naval Target Practice. This got his innovation adopted and, in the end, won him great respect and honor. But Roosevelt's intervention was a stroke of luck. Most officers who buck their chains of command so flagrantly are dismissed.

What was Sims's problem? He made a claim and backed it up with a lot of objective evidence. Historians tell us the reason leadership rejected his claim was they believed his proposal would disrupt the "ship society." The gunner corps was elite and specially trained. Sims advocated a capability that would allow any sailor to be a good gunner. Sims's mistake was to assume hit rate was the main criterion of importance to the Navy leadership. They had other standards around the social impact of the new technology. Had Sims included arguments about how the technology would enhance the ship society, he might have gotten a different response.

These examples illustrate a key point about grounded claims. It is wise to learn all the criteria important to the listeners and provide relevant and sufficient evidence for each criterion. Otherwise, the grounding offered will not be compelling.

### Subjective Grounding

As a manager or leader, you hire or select people to be on your team. You are very interested in their competence because without it your team cannot perform. When you interview people for a place on your team, you have to evaluate their competence claims. These claims can seldom be objectively grounded, but they can be subjectively grounded.

To be competent means to be able to perform standard actions in a community without supervision and without causing breakdowns for customers. Communities develop criteria for assessing competence and awards for recognizing outstanding examples. In assessing a competence claim, it is very important to learn what the community members say about the prospect in terms of performance tests, recognitions, and testimonials.

The first thing to notice about a competence claim is that it enters your awareness with the status of a hypothesis, and evolves to an acceptable statement as you consider the evidence in light of your acceptance criteria. Unlike a scientific hypothesis, this claim cannot evolve to the status of a fact. The reason is that your "data" is actually the opinions of others, who may not agree on the interpretation of what they have witnessed. Since your

## Anatomy of a grounded claim.

	Distinction	Explanation
Structure of a supported claim	Claim	Statement that something holds; the something is usually a hypothesis, evaluation, judgment, or opinion.
	Fact	Statement that something is verifiably true; can be independently re-verified, and possibly falsified.
	Opinion	A judgment, assessment, or estimate of something.
	Grounding	Series of statements relevant to and supportive of the claim. For objective grounding, all supporting statements are facts. For subjective grounding some supporting statements may be opinions by trusted speakers.
Acceptance criteria of the claim and its support	Domain	Community, discourse, discussion, situation, event to which the claim applies.
	Purpose	The point of making the claim. What are the concerns? Who cares?
	Relevance	Are supporting statements connected to the domain and purpose of the claim?
	Sufficiency	Are supporting statements sufficient in number to support the claim?
	Frame	Is the claim credible to the community to which it is offered?
	Balance	Does the speaker deal adequately with opposing arguments?
	Commitment	Is speaker committed to defending the claim and taking care of its consequences? Is the speaker's purpose genuine?
	Comportment	Does the speaker display confidence? Authenticity? Centeredness?

data are is all facts, the claim cannot be objectively grounded. However, it can be *subjectively grounded*—meaning that you are willing to accept both the supporting facts and opinions and bring the candidate onto your team.

In addition to community opinions, you will want to evaluate whether the prospect's expertise matches what you need for your team and whether their expertise meets all your requirements. For example, you may not want a competent Web programmer when your team needs a game programmer, or you may want someone who is competent both at programming and team management. You may have other criteria to evaluate as well.

Once the person joins your team, you are hardly done in evaluating their claims. For example, in daily work, the person will claim they can deliver a result by a certain time. Can you acceptably ground that their claim is within their competence, that they are sincere, and that they are reliable?

### Truthiness

In 2005 Stephen Colbert, the political satirist, proposed the new word

“truthiness” to mean the presentation of claims supported only by gut feelings or emotional beliefs. Truthy claims are nothing more than ungrounded assessments. Nevertheless, they can gain allies.

Negative political advertisements, which are common during elections, are effective because so few listeners are skeptical; they are willing to accept claims without evidence. If they actually checked for supporting evidence, they would find the claims unsupportable, and reject them. Rick Hayes-Roth has recently devoted an entire book to this problem and to means for combating it.<sup>2,3</sup>

It is quite easy to confuse a truthy claim with a truth because the claim is often worded in a manner such as “I claim that...” or “I assert that...” or even “It is true that...” Do not let the choice of words obscure the basic distinctions of claims and grounding. Get into the general habit of noticing whether a statement is a claim, an opinion, or a fact. Then you are on solid ground when it is time to decide whether to act on the claim or not. Make acceptance of a claim a conscious choice.

### Conclusion

The grounding practice is the skill of making claims that move people to action. Your goal as a speaker is to give your listeners plenty of well-crafted support for accepting your claim. Your goal as a listener is to decide whether you accept the claim based on the supporting evidence.

The accompanying table summarizes the distinctions for grounding claims. A grounded claim consists of the claim statement and a set of supporting statements. The acceptance criteria can vary according to the listeners and their standards, but will include one or more of the eight criteria listed.

When gathering data, therefore, you need to fully understand the listener's concerns and interests. You want to supply relevant data—directly supporting the claim and the purpose for which you make the claim—and omit irrelevant data no matter how interesting they may be to you. You want to have a sufficient amount of data to be convincing.

The grounding practice is also helpful for assessing background assumptions to see whether they are well grounded in the current environment. For example, is my self-assessment that “I'm not good at management,” or my group's assumption that “There's no way to cut the red tape,” grounded? If an important assumption is not grounded, we would want to stop accepting and acting on it, and replace it with a new, grounded assumption.

Grounding claims is an essential professional skill for practitioners, managers, and leaders. The skill supports many decisions, and will help us design trustworthy systems. **□**

### References

- Denning, P.J. and Dunham, R. *The Innovator's Way: Essential Practices for Successful Innovation*. MIT Press (2010).
- Hayes-Roth, R. (interviewed by Peter Denning). Honesty is the best policy. *ACM Ubiquity* (July 2011); <http://ubiquity.acm.org/article.cfm?id=2002437>. DOI: 10.1145/2002436.2002437.
- Hayes-Roth, R. *Truthiness Fever*. Booklocker.com, 2011.
- Latour, B. *Science in Action*. Harvard University Press, 1987.

**Peter J. Denning** (pjd@nps.edu) is Distinguished Professor of Computer Science and Director of the Cebrowski Institute for information innovation at the Naval Postgraduate School in Monterey, CA, and is a past president of ACM.

Copyright held by author.