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Defining "Done": Getting a Clear Signal on Your Projects

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Measuring "done" on a construction project is sometimes as challenging as describing a black hole — these two enigmas both require being inside to truly understand their nature, yet the information from the inside does not escape in a cohesive form.

So how is it possible to know what is happening inside without being there? A classic exchange illustrates the problem: A project manager (PM) visits the job and asks, "When will you be done?" The field supervisor answers, "We should be done by the end of this week." Then the field goes quiet until the PM realizes two weeks later that another 100 hours were spent. The PM calls the field supervisor and asks, "I thought you said you'd be done two weeks ago — why are there hours still being charged to the job?" The field supervisor replies, "Well, we weren't completely done, but we’re getting there." The cycle repeats itself, draining time, effort, and money from all parties while the labor works to meet the needs of their company and its customers.

This scenario reflects poor project management, but the crux of the issue is the black hole of the work environment, which is left to the labor to report on. It’s difficult to capture accurately and in a timely manner, and even more difficult to translate into information that can be acted on effectively.

With reference to the standard practice for job productivity management (ASTM E2691, covered in a previous article [1]), this article explains how contractors can enhance their process for collecting jobsite information using technology to avoid having to wait to hear we’re "officially done" at the end of a project — a delay that drains profits and ties up resources unnecessarily.

TUNING IN TO THE JOBSITE

Contractors can place several antennas to gather information from the jobsite, yet the black hole still exists without direct input from the labor as part of the measurement system. The following displays the common antennas that most contractors have in place as well as a few rare antennas.

Common antennas describe the job after the fact, and with a good signal receiver in the process and software, this data can drive adjustments quickly and as needed.

Rare antennas are less common because the data they require is harder to collect and less often required for job reporting.

- Common antennas:
    - Time spent
    - Quantities installed
    - Daily logs
    - As-builts
- Rare antennas:
    - Distractions and obstacles

- Safety hazards and near misses
- Coordination minutes, results, and conflicts

Under Accounting Standards Codification Topic 606, effective 2018, antennas must be enhanced to measure completeness relative to performance obligations. Progress toward fulfilling those obligations can be measured using effort expended, not just cost-to cost or quantities installed.

This enhancement helps any contractor avoid being "done" multiple times because progress is measured independent of time and cost and links directly to the work required for the customer to accept the project as complete.

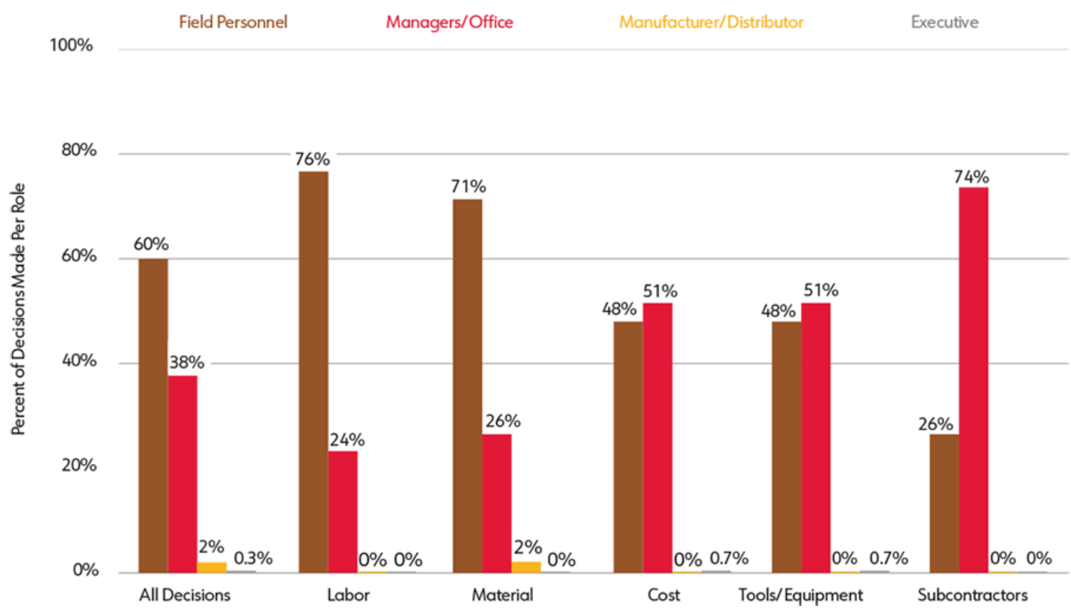
Frederick Taylor pioneered this method of measuring work by observing the person doing the work.

He also described management’s role in translating that information through a system of measurement: "It is true that whenever intelligent and educated men find that the responsibility for making progress in any of the mechanic arts rests with them, instead of upon the workmen who are actually laboring in the trade, that they almost invariably start on the road with leads to the development of a science where, in the past, has existed mere traditional or rule-of-thumb knowledge." [2]

Because the capture of work, waste, and percent complete requires input from the skilled trade, and most projects lack the technology to capture that input, the project sends unreliable (at best) signals about what "done" means and what may be preventing it.

Based on previous research, more than half of the decisions made by labor when faced with obstacles at the point of installation are never captured. [3] Exhibit 1 shows the latest results of the authors’ industry-wide Industrialization Litmus Test, in which 60% of decisions about the work and jobsite are still made in the field.

Exhibit 1: Industrialization of Construction® Litmus Test



CLARIFYING THE SIGNAL

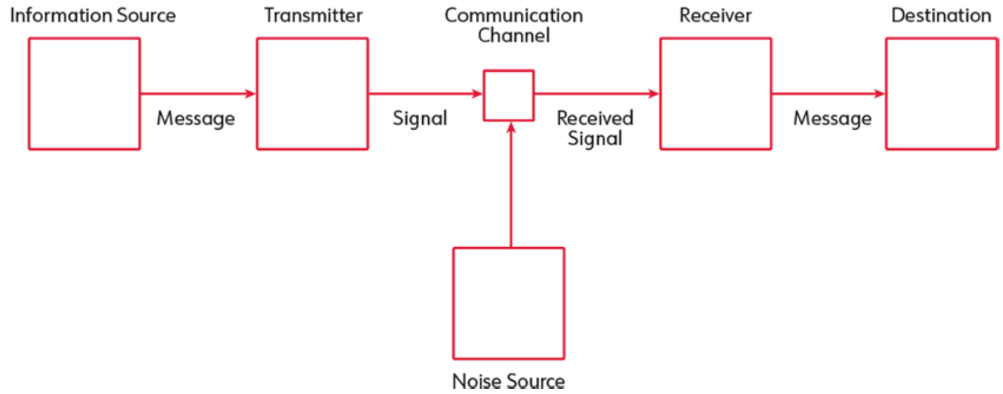
With the correct antennas in place, the next challenge is getting clear and useful messages from them. First, that information must be encoded into something digestible by the parties who need to know and act on it.

Next, the channel for sending that information must be free of "noise," including added opinions, too much data, or irrelevant data. Additionally, the channel must be strong enough to carry the information to the right recipients.

Often, the field tries to work through or around obstacles (at lower-than-expected productivity), not recognizing that the same heroic efforts take place on jobsites company-wide without a system to collectively see and improve the situations. Without channels to capture and translate the obstacles and their cause and effect across projects, contractors will have invested in antennas for nothing and the black hole will only continue to grow.

So how should a system be designed to collect and use data effectively? Exhibit 2 depicts what Claude Shannon translated from thermodynamics into information management to improve message transmission during World War II and the industrial expansion of technologies that followed — from the telegraph and telephone to the tools used to communicate today. [4]

Exhibit 2: Communication System



In Shannon's communication system, the information source is the capture of the original message. The original message is changed into a signal by a transmitter before being sent over a communication channel and received by the receiver. From there, the receiver interprets the received signal back into the message.

This communication system can be interpreted for both technology (including telephones, radios, and video calls) and more abstract communication flows, such as conversations or other human interaction. In a general conversation, the information source can be thought of as the brain, the transmitter as the voice, and the communication channel as the air between the person talking and the person listening.

However, communication does not happen independent of other influences. If outside influences affect the interpretation of the message or if noise is introduced, then the message can be distorted or lost before reaching its destination. If the information source chooses to send the correct message and the channel is clear, then the receiver may still fail to decode it correctly for interpretation and action.

So how does this model apply in construction, especially in measuring completion and obstacles to it? Consider the current channels to communicate "done" with Exhibit 2 in mind.

Who?

Ask who is transmitting the information about what is done or who is stopping things from getting done.

The purest source of this is the installer, although that worker is not necessarily in tune with measuring their work while it’s being done, according to Taylor. Typically, the field supervisor or field engineer becomes the message sender.

The Short Interval Scheduling (SIS®) process as part of the ASTM E2691 standard [5] is built to capture the purest information about scheduled and completed work and obstacles.

What?

Ask what information is transmitted, how, and when. The most typical and consistent information transferred is hours spent, which has no relationship to completion of work (like referencing the gallons of fuel burned in a vehicle to measure distance traveled). A true measure of work completed, as prescribed in ASTM E2691, is required.

Jobsite information is often transmitted using informal channels (e.g., verbal conversations, email, text, in-person), which are likely to be noisy and inconsistent.

Consider what technology can capture useful feedback consistently (such as the antennas described previously) and formally to avoid burden on the receiver.

Who?

Find out who receives the information about done. The PM should be the first line of receipt, and the more projects they manage, the more critical a consistent, quiet channel becomes. Other roles may also need to be kept informed and may help interpret and act on the information.

Consider using a responsible, accountable, supportive, and informed chart as part of the project kick-off process to determine who will be in the support and inform roles for receiving information about completion or obstacles.

How?

Uncover how the receiver interprets and acts on information. This is as critical a component in the process as the antenna itself.

Lead indicators such as change in production rate, hours affected by obstacles, and safety "good catch" metrics signal what could happen and what can be avoided. However, if the PM does not pay attention to the signals, ask for help or support when needed (from managers, customers, or even vendor peers), or inform executives and key stakeholders of risk, then the communication system has failed

The communication system needs to be designed to prompt appropriate action without overloading the sender or receiver.

For contractors, Shannon’s communication system can apply both to and from the field. Knowing how to get the right information to the field at the right time is key to making corrections or taking action before situations that could harm the job outcome are set in stone.

However, knowing what action needs to be taken requires that the right messages be sent from the field — either directly from the field employees or from the systems and antennas in place to automatically raise flags. Not receiving such information can lead to even more difficult, and sometimes dangerous, outcomes.

Getting the Signal to Its Destination

Even if the right message is sent, if there is any noise in the communication channel between the sender and the jobsite, the signal and message could be misinterpreted. This is the Achilles Heel of any measurement system. Misreading the signal leads to the wrong communication channel — and, ultimately, to no action at all.

Properly interpreting a signal requires understanding the message, impact, and urgency behind its presence.

For example, being at 50% complete when 80 of 100 budgeted hours have been spent carries a much larger impact than being at 90% complete. The message being transmitted is clear: There's a major risk of not completing the job within the budget, which will hurt the job's profitability. The level of risk determines who should receive the signal and the channel used to escalate it.

When considering the target of the message, the action needed to elicit the desired change should guide that decision. The specific individual or group of people with the ability or decision-making power to complete the intended action should be the audience.

How the signal should be escalated depends on its complexity and the level of risk associated with it. The complexity of the situation depends on several factors, including the audience's role and background and the source from which the signal originates.

In reflecting on the earlier example, when the work for the job is 50% complete while 80% of the budgeted hours have been spent, delivering this information to a GC alone will not influence them to act.

Instead, backing up the signal with the information as to why the situation arose (such as documented coordination issues) and proposing alternatives that will help the project overall (such as change in work sequencing) could evoke an actionable response.

Appropriate channel selection enhances the probability of successful action, making it a critical factor in converting a signal into measurable results.

For example, a complex message with a high level of risk should not be communicated through a hasty or informal channel, whereas a simpler signal should not take up time in formal meetings and can be kept to a briefer transmission.

Two examples illustrate how this plays out in practice — one in which the channels work and one in which they fall short.

Example 1: Effective Communication Channels

In the first, each channel contributed to a defined objective and an actionable response. On that job, the project team used JPAC® and SIS® (ASTM E2691 applications) combined with project scheduling as antennas for monitoring the job's signals.

Early in the job, a monthly review was established between the subcontractor, GC, and scheduling team. The meeting acted as a formal channel between the parties to proactively escalate and address signals derived from their antennas (rather than just opinions or informal allegations).

The approach proved its worth when the GC proposed moving up the completion date for the subcontractor's scope of work. The subcontractor used the information derived from their antenna to conclude that the request wasn't viable. From there, the parties proactively negotiated and identified which tasks could be pulled ahead and completed earlier and which tasks were not essential to complete ahead of time.

Without that communication system, the subcontractor could have faced compressed work schedules, inevitably causing a large, unbudgeted increase in labor costs.

Example 2: Ineffective Communication Channels

In other cases, signals can go unheeded and unforeseen risks become reality.

In this example, the signals of risk were transmitted but not effectively communicated. The project team on this job used most of the antennas previously discussed in the first example, which resulted in similar signals being produced; however, the information system lacked robust channels for escalation.

The data indicated slippage early on within the GC's schedule. Recorded impacts resulted in high occurrences of coordination issues, lack of access to areas, and trade interference negatively affecting the job's overall productivity.

Unlike in the first example, this project team didn't amplify their signals. Like many project teams, they had informal discussions about what they were seeing as impacts and issues, with no notes nor agreed-upon corrective actions among the operational teams between the trades and the GC. The data clearly showed the impacts, yet everyone thought it would get better as the project progressed.

The lack of escalation and action became a persistent issue and resulted in a 38% increase in labor cost at the end of the job. While many PMs and field leaders from all trades are victim to early optimism and informal agreements on how things will play out, a data-driven approach to managing work, effort, and time, collectively and collaboratively, wins every time. The case underscores the need for well-defined channels to action so that signals translate into results.

AMPLIFYING THE TONE FOR DONE

Assuming antennas are in place and signals are coming through loud and clear, what does the clearest and loudest signal of done look like? A simple rubric compares percentage complete in terms of time (duration), hours, cost, and quantity (if available).

If 50% of the cost has been spent but only 30% of the time is complete, then something is off and needs to be explained.

Guessing is dangerous, so triangulating the data is essential. Keep in mind that data representing time, cost, and quantities alone will not prevent the field from saying "I'm done except for ..." because the definition of done may be relative to work required to complete performance obligations to the customer, which are not measured with time, material, or money. A reference point is needed for all the work necessary to finish the project. Building the reference point takes four steps:

1. Complete a detailed walkthrough of the jobsite, noting what work remains in each area, such as finishes, testing/commissioning, labeling, cleanup, or return of tools and materials.
2. If a work breakdown structure (WBS) is already in place, use it as a reference during the walkthrough, splitting out or adding task details. If no WBS is in place, then one should be created for the best reference of what the field sees (and does not see) about what work is required to complete the project.
3. Evaluate what is needed to complete the remaining installation, testing, and cleanup: Are the required tools, equipment, materials, and skill set in place to ensure the job is completely done?
4. Estimate the effort of that work and assign hours to each task.

By the end of this process, 100% of the work needed to reach done should be explicit. That road map provides a measurable reference point for recognizing true percent complete in the final weeks or months of a project — and for transitioning it cleanly to maintenance and delivery to the customer.

TOWARD OPTICAL PERCENT COMPLETE

Today, input on completion of work relies on the field leader's evaluation of tasks from a WBS. As hardware, software, and AI continue to advance, measuring with Optical Percent Complete (OPC™) will soon be reality.

Camera use on jobsites has grown rapidly across large construction and commercial projects, driven by needs for security, safety, and progress monitoring.

In recent years, security cameras have become more widespread to help deter theft. Time-lapse cameras are also increasingly common, providing clear visual updates for management, owners, and other stakeholders, often with realtime streaming capabilities.

More recently, AI-enabled cameras have been introduced to monitor jobsite conditions, identify potential hazards, and alert workers to reduce the risk of injury. As camera and AI technologies continue to advance, assessing percent complete may no longer depend solely on detailed trade expertise. Instead, trained AI systems can analyze installed work compared to the remaining scope to support or even automate progress evaluation.

Because AI and advanced analytics learn from consistent work definitions, repeatable units, normalized capture, method tagging, constraint classification, and environment/context tagging, the WBS — codified with labor codes — becomes the global learning data set that powers them.

Traditional construction management reacts to symptoms and discrete events, confusing tools such as work packages — which can at best provide a localized or job-level breakdown and production measurement — with the system-level productivity measurement a WBS provides.

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CONCLUSION

While technology can always be built to enhance human experiences, the human experience itself needs to be captured in that technology.

The value of this experience in skilled trades and the interactions amongst them are worth capturing, as purely as possible, to understand how it can be improved.

The measurement method of ASTM E2691 is designed to do just that, and as simple as it sounds and as accurate as it is, the challenge is in the process, not the technology.

In the vein of Taylor and Shannon, understanding what's happening in the work and communication is the only way that a wheelbarrow or a telephone will help humans benefit in the long run.

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Endnotes

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*3. Moore, Heather. "Exploring information generation and propagation from the point of installation on construction jobsites: An SNA/ABM hybrid approach." Michigan State University. **d.lib.msu.edu/etd/2277**.*

4. Shannon, Claude & Weaver, Warren. The Mathematical Theory of Communication. University of Illinois Press. 1949.

*5. "ASTM E2691-20: Standard Practice for Job Productivity Measurement." ASTM International. **store.astm.org/e2691-20.html**.*