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Why HS2 can change the map of Britain

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AUTHOR
Steve Mulaik

Crowd engineering

Old-style time and motion studies might not seem relevant to today's manufacturing environment when it comes to looking at ways to work smarter, not harder. But by focusing on the nitty-gritty, it is possible to tune in to what makes a workforce collectively smart. Applying efficiencies from one team member across the board can lead to huge advances for the whole operation. Steve Mulaik explains why crowd engineering could be the answer you have been looking for.

'Now one of the very first requirements for a man who is fit to handle pig iron as a regular occupation is that he shall be so stupid and so phlegmatic that he more nearly resembles in his mental make-up the ox… Therefore the workman who is best suited to handling pig iron is unable to understand the real science of doing this class of work.' Frederick Taylor, Scientific Management, 1911

'Ask a hundred people to run a 100m race and then average their times. The average will not be better than the fastest member… ask a 100 people to make a decision and the average decision will be at least as good as the most [intelligent] person. We are programmed to be 'collectively smart.' James Surowiecki, The Wisdom of Crowds, 2008

The above two quotes offer two very different views of the common American or European worker. For the past two years, the author has been exploring the use of Surowiecki's premise in manufacturing and distribution sites. Our experience seems to reinforce Surowiecki's ideas and point to an entirely new way for companies to noticeably reduce operating costs using a new technique we call 'crowd engineering'.

Hope in a cash-strapped world

It almost sounds like one of those late night TV scams: 'You too can find 30% increased productivity and not spend much on capital! Call us now!' But our research seems to suggest it might just be true – at least at high-throughput distribution centres and light manufacturing operations.

The source of our optimism is found in five critical, yet unspoken truths about many current US and European operations that we visit:

1. Most sites stopped looking at their actual physical operations in elemental detail in the 1970s – think: 'How many seconds does it take for me to grab a knife and open a box?'

2. Most sites do not really train their people in the physical motions of a job – employees make it up as best as they can.

3. Left to their own devices, employees will often discover small productivity enhancements that most managers rarely notice or are unable to verbalise and then usually do not build into any standard method for a job.

4. The central difference between the better and the average performers at a site is most often methods, not motivation and how hard they work.

5. Large gains in productivity are achieved not through finding two or three things associated with a process that each saves 10%, but by finding many small things that each save 2% to 3%.

Getting back to the basics, the authors have found that significant productivity gains can be achieved in most places by finding out what the best people do and teaching these motions to the average performers. We tell associates – who often are very suspicious of our motives at first – that these gains will not come from working harder; they will only come from working smarter; no one needs to sweat any more than they do today, and all being well they will work a little less! Even better, the authors believe the best way to discover the smarter path is to enlist the operators directly in the search. We call this methodology crowd engineering, because everyone gets involved.

We openly admit this technique builds on several past process improvement techniques, such as motion studies, that have fallen out of favour or become too costly to pursue. However, we believe by using parts of these old approaches combined with new technology and a different philosophy about the worker's role in this process, the efficiency of methods improvement can be greatly improved. This leads us to suggest that crowd engineering generates superior results to any current or past process improvement methodology. Furthermore, it is worth noting that it works well in so many places because it takes advantage of the situation that the popular approaches to labour productivity improvement have created.

Today's operations are not yesteryear's operations

When the author first went to work in manufacturing in the 1980s, most operations had industrial engineers who ran around with a stopwatch and knew intimately how long it took to make most motions related to a job. They spent a lot of their time observing actual operations to determine how long a job should take, and in doing this they also discovered the 'one best way' to do a job. This was called methods engineering.

In the 1980s and '90s methods engineering started to become a scarce practice. As most labour-intensive manufacturing moved offshore, the pool of people who knew how to do methods engineering gravitated into other industries.

Second, competition for engineers drove salaries to a point where many companies downsized the floor engineer position, which translates into a more hands-off, less detailed approach to process engineering. As a result, much of the process design and improvement today is left to managers and supervisors that do not have the training and cannot devote enough time to go into any level of detailed observation.

Even at those places that are able to keep engineers on staff, the work that is being done is not as valuable as it could be. Engineered labour standards work well when practised as they are taught. Unfortunately, for a wide variety of rational-but-not-so-great reasons, time saving short cuts are being introduced by engineers that undermine the benefits achieved with these methods. In a larger proportion of such projects, engineers tend to give more time to defining a work standard for a process rather than improving the method used for the operations associated with that process.

This is not entirely their fault. When it comes to process improvement, there has been a subtle shift in philosophy by management. Managers are less keen on observing the process and more interested in measuring the output of the process. Unlike yesteryear, firms today tend to be much more concerned if there is no measuring system in place than if their people are

following an efficient and safe process. Consequently, they make sure they have time and output reporting, but seem less concerned about providing the tools and training to keep their people efficient. So, the focus is too often on speed and pace, and less on process and technique. This change in your father's plant or distribution centre has had consequences.

Looking back, there are regrets

The current state of process improvement tends to result in three common regrets. Firstly, when we interview supervisors about their experience, focusing on just the numbers instead of the methods driving the output, many lament: 'We should have simplified the operations before we put the standards in place. We would have got a lot more out of them.' But that would have required detailed observation and time that was not planned and possibly was not considered to be cost-effective at first by management.

Secondly, facility and engineering managers tell us that today's supervisors do not spend much time actually watching people work and counselling them anymore. Most of supervisor time is spent looking at the production numbers of their people and explaining variances. The performance of the individual is no longer a supervisor duty, it has become a number. Sadly, fewer and fewer supervisors even know how to achieve great performance from their people on a given operation or process. It is likely true that many supervisors would struggle to meet standard rates for the processes they manage.

Thirdly, it is not unusual for us to see 30% or more of the people at many distribution centres and manufacturing plants working below the acceptable standard. Looking closer to explain this, we too often see operators receiving inadequate detail and training on how to best perform an operation and/or the engineering work used to generate the standard is not being done properly. Regardless, without the right design and training, as well as follow-up, the operators are left to discover an efficient method on their own. It is frustrating for them to know that someone is watching what they produce, but offering little to help them in how they do it.

Back-to-the-future: finding a teeny-tiny diamond in the rough

It is easy to be dismayed by what is going on, but the good news is that it is reversible. Yes, the laissez-faire approach to floor-level processes must go, and it does not mean you must fire all your supervisors. Our crowd engineering approach involves studying the processes in detail, but not with a team of engineers armed with stopwatches and clipboards. We suggest using modern technology, such as digital video, the internet and software, along with the crowd of workers to discover the most efficient process.

Look at the graph in Figure 1 developed by our consultants at a manufacturer of home décor products. It shows the time that five different operators spent assembling the simple product, such as the one to the right of the graph.

The client asked us to explain the difference in rates between operators. To do this, we shot video and analysed each operator performing this 30 to 40-second assembly operation. We then broke down the assembly operation into about 10 sub-operations, so we could compare the average time of each operator performing each sub operation in a chart – see Figure 2. The list of sub-operations included such things as grabbing a base for the product off the conveyor, making a hole in the base to insert the other parts, gluing the parts of the product together, and so on. Using a chart like the one in Figure 2, we determined the fastest person for each sub-operation. Then we went back to the video to figure out why they were faster. What we found next – and have found at many clients since – is a little counterintuitive.

Our clients almost always attribute differences in employee performance to the fact that some people are just naturally faster paced. In this case, the manager also voiced concern that the older people doing the work might be slower. But in a victory for the Theory Y-ers of the world, the differences are mostly tied to how each operator does each sub-operation within assembly and not on how hard they work. What is even more interesting, and very important to understand, is that *an untrained eye, without the aid of video, might never see these little 0.5 to 2-second differences in method used by different operators.*

Sub-operation: make a hole in the base

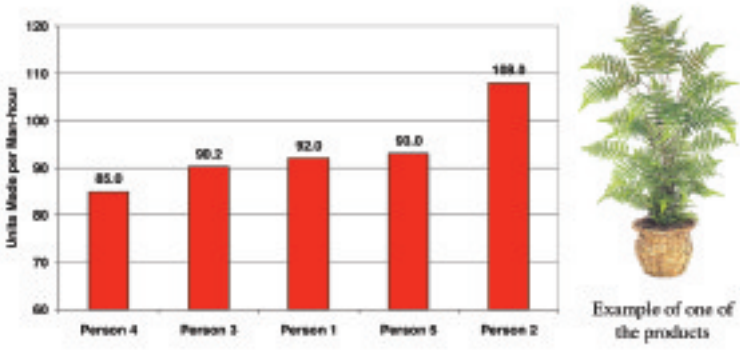
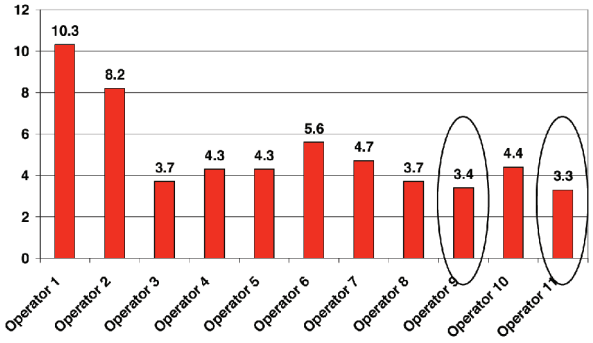


Figure 1

Sub-operation: make a hole in the base



For each sub-operation you need to identify who is the fastest at performing that sub-operation and then go to the video to find out why.

Figure 2

The next big, good thing

We think such nearly sub-second differences go unnoticed everywhere. Over the past two years, we have visited a dozen or more clients and at every place we deploy or test this methodology, we continue to see the same phenomenon – that is, a few workers have come up with ways to improve each sub-operation by 20% or more, but no one really recognises it.

It is not just in manufacturing where this happens, either. It is also common in distribution. We have watched pickers and packers at retail and direct-to-consumer distribution centres exhibit the same phenomenon. There are lots of ideas to be mined from everyone everywhere.

What is even more exciting from an implementation perspective is that Surowiecki's premise is confirmed by our finding that even the fastest workers do not follow all the best methods. Consequently, we do not just observe the fastest packer and then teach all the other packers how to pack like him or her, we also mine best practices from the whole group. We do this because we can often find superior methods for performing some sub-operations by watching lower performers who do not have the best overall method for an operation, but at some part of the operation they are really, really fast. Even slow people have something to teach the fastest of the group.

For example, at one high performing distribution centre, a blue adhesive label was applied by the packers to each overnight package so they could be found easily near the end of the shipping cut off. When we observed the operation, we found one of the slowest packers had discovered a much faster way to mark the packages. This woman brought in a circular blue bingo stamp from home and stamped each package rather than spend the time to peel off the adhesive blue dots. It was a brilliant, yet simple, method even to the fastest packer. After we revealed this to the management team, the client bought a stamp for the entire group of 120 packers the next week. This lady had been doing this for 14 years and yet it went unnoticed.

So this illustrates the other brilliant benefit of the crowd engineering approach. Unlike the us vs them nature of many attempts at labour standards and process improvement in the past, this type of project generates better results and engages everyone positively. The slowest people potentially have something they can teach to the fastest and vice- versa. This method will actually build camaraderie rather than create conflict. It works in union as well as non-union environments.

Furthermore, because this methodology is focused on how the workers do their jobs and not how fast they work, it is really well received. We have found that no one seems to take offence at working smarter; it is working harder that bothers people.

What are the barriers?

To say this back-to-the-future approach is easy to implement would be a bit of a prevarication, however. There are two major hurdles to making this work:

- You have to look at a lot of video of a lot of people to find out what the best methods for each sub-operation really should be
- Getting enforcement or encouraging operators to follow the new methods is much harder than figuring out what they need to do

Packaging operation

Figure 3

The operator on the left is peeling a blue adhesive label to apply to the shipping label on the package to her left.

The operator on the right is stamping all of the next-day shipping labels with a bingo stamp.

The authors compare traditional process improvement techniques to this approach as looking for gold using binoculars vs searching with a microscope. There is a tremendous amount of video that needs to be shot and a lot of analysis to be done to cull out the best practices. If there are eight major operations, you might need to watch 10 people at each operation two or three times each for 10 to 20 minutes each time. This can add up to man-weeks just generating the video. Then there is the issue of analysing it all and assigning average times to each sub-operation for each operator and identifying the best operators at each sub-operation. After this, the method changes must be confirmed and the best methods aggregated into a new overall method for each operation. A project using old-fashioned motion study methods could take man-years.

The authors have solved this using Thomas Friedman's 'flat world'. Our consultants in western countries shoot the video – sometimes the workers do it themselves – and then send it via the internet to our offices in Mumbai, where people pour over the film. We have essentially created a 'process improvement factory' there, with proprietary software to make the motion analysis and discovery of best methods extremely efficient. This is a great boon for our western consultants, who now spend most of their time organising tests of best practices at the site and then teaching the new methods – once proven – to client staff. Today, our western consultants do very little data cleaning, collection or preparation any more on these projects, and they are happy with that situation.

Flat world theory

Figure 4

Another advantage of a 24-hour global operation is you can reduce the calendar time it takes to get results.

Video shot during the day can be analysed and ready by the next morning.

But in the midst of a recession, you do not have to have an office in Mumbai to do this. There are plenty of people available for hire at very good rates in such an economy. You do not need them to have deep process knowledge either. The majority of our staff overseas have not worked in any manufacturing plants; they are just well versed in Excel, Access and our software tools for analysing video. That is OK, because we need them to watch the videos and only do the motion study analysis and identify the operators who are fastest at each sub-operation. The people with the process knowledge who will confirm why a given operator is fastest and aggregate the best practices into a practical, method that may be learnt by all are on site.

You can do the same thing and beat this first hurdle. Hire inexpensive part-time employees to shoot the video and do the motion studies. Use your current, on-site staff who know the process and the people well – that is, process experts – to test what method changes are really worth making and to teach the new process to all the operators. The outside resources just make your process experts more efficient. In this way, you, too, can investigate scores of method changes efficiently, just like we do.

Once you have confirmed the best methods, however, your job has only just begun. Getting people to change is very hard. You are working against muscle memory when you work at the nearly sub-second level. People who want to change how they pack boxes still have a hard time overcoming muscles that have done something the same way for 10 years or more, but hope can be found in a little patience and a lot of sugar.

We have tried negative reinforcement and positive reinforcement. We truly believe positive reinforcement generates the better results. While we leave the specific method to the reader, we have found rewarding associates at work if they are caught following at least a couple of the best practices works wonders. The employees love it and it makes for quite the uproar on the factory or distribution centre floor. Word gets around. The best practices circulate like good rumours in this manner.

Note that this does require that the company pays someone to walk around and observe what operators are doing, but again, this does not have to be a high-powered MBA holder. A reasonably sharp hourly person can be given this task. It's less important that they be educated and more important that they are comfortable with people. We suggest looking for someone who is a pixie rather than an erudite ogre.

Where will this NOT work well?

It is important that this not look like a panacea for labour productivity. It certainly is not. The authors have seen it flop at some places. If you do not have a lot of labour content tied up in any one process, it likely will not be as much benefit. The more processes you have to look at to make an impact on the operating P&L, the less beneficial is this approach; but if you have two or three operations where 90% of the labour is located and those operations do not have constantly changing missions or lots of different SKU-related processes, then this is for you.

Another issue is the shorter the cycle time associated with a process the better. It is harder to get the savings from a process that takes 20 minutes to complete one cycle of sub-operations than one that takes 12 seconds. Stated slightly different, it is easier to deploy and save labour with this methodology if there are only six different sub-operations to study than if there are 60. It can be done, but it takes more time to inventory the best practices and longer for the associates to learn them.

Another critical factor is being able to see clearly where one sub-operation ends and another begins. In most processes, this is easy. There are some processes, such as repair, where the operator oscillates between trying to figure out what to do next and then doing the next sub-operation. It can be hard for the video analyst – and consultant – to study these processes properly. Sometimes the video analysts need to be trained fully in the process itself before he or she can analyse it.

Another key to success is having a large crowd to draw ideas from. If there are only two or three people who do a particular operation and they work at the same site, you are not likely to see a lot of method variability. If there are 20 or 30 people, the crowd engineering technique works much better.

Also the longer the staff have worked at an operation and the less they communicate about what one another does the better crowd engineering tends to work. The few sites where there has been a lot of standardisation of methods might find this less valuable also.

Conclusion

We acknowledge that crowd engineering has a certain 'back to the future' flavour: it is not entirely new. It is a conglomeration of several old method-centric techniques – time studies, motion studies, quality circles – that have been modernised to take advantage of changes in technology and the workplace. We hope this does not distract the reader from what we believe is today's best bet for improving labour productivity at most sites. If you have never studied your operations in much detail or your standards were set years ago, by mining the crowd of workers, you can find the best way to do a job, save a good chunk of money and have a good time doing it.

The good ideas are out there; we guarantee it. You just must go and find them and tell everybody.

About the author

Steve Mulaik is a partner with The Progress Group, a logistics consulting firm in Atlanta. The Progress Group is part of a global consulting consortium known as the Supply Chain Group (SCG) based in Ulm, Germany, which has operations in the UK, Poland, the US, Italy, Germany and India.

Web site: **www.supplychaingroup.com**

Further information

Further information on this article, contact: Mike Wilson. Email: mike.wilson@the-scg.com