Introducing Dig Worldwide COG^Intel

A Time and Cost Efficient Alternative to Technical Cost Modeling

The **Primary Intelligence** Company

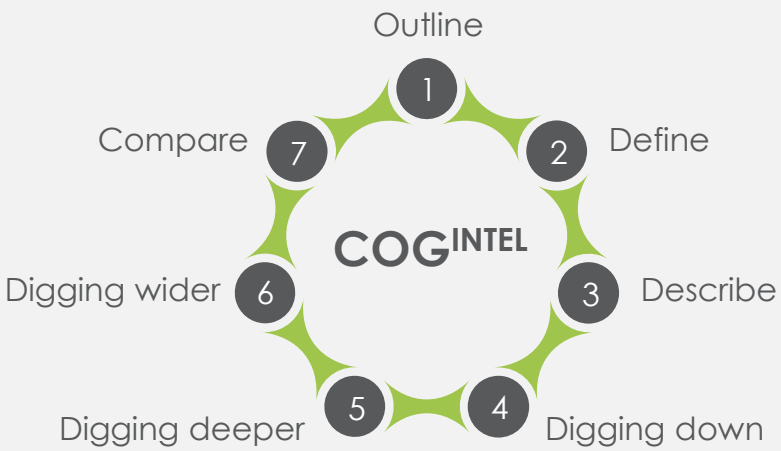
Introducing Dig Worldwide COG^{INTEL}

This whitepaper introduces COG^{Intel}, a Dig Worldwide methodology for benchmarking cost-of-goods manufactured. This methodology can be applied across a broad range of industries and can be performed at most levels within a company.

The keystone to Dig Worldwide's COG^{Intel} methodology is the definition of an equivalent unit. Any project, be it benchmarking manufacturers of (die-cast) wheels, toothpaste, PV solar panels or a biotech medicine will have its own unique equivalent unit.

In short, in order to measure one cost of a manufactured product or service against another, it has to be comparable. This whitepaper will walk you through the steps to help you define an equivalent unit so it is possible to compare your manufacturing costs or process against one or more benchmarks.

To get you started, two methodologies will be discussed: the aforementioned COG^{Intel} and Technical Cost Modeling (referred to as TCM). Our aim is to highlight how Dig Worldwide's COG^{Intel} offers a cost effective, robust and field-tested alternative to the long established TCM methodology.



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TCM OVERVIEW

More than twenty five years ago, TCM was developed by the Massachusetts Institute of Technology.1 The methodology evolved from traditional activity based costing to using engineering, technical and economic characteristics associated with each manufacturing step to evaluate its cost. TCM is frequently used to strategically align R&D with the commercial needs of an organisation - be it predicting the cost of a new process, facility or technology, comparing alternative strategies or assessing differing investment opportunities.

Examples of TCM implementation are as diverse as McDonalds using the model to optimise the costs of its manufacture of chicken nuggets, the deployment of a next generation phone network by Nokia Siemens or the transportation of satellites into space by the European Space Agency.

The methodology starts with the identification of the process and the steps required to manufacture a particular product or product component. It is often referred to as the "bottom up" approach to Cost-Of-Goods (COG) assessment and benchmarking.

With TCM, the cost of each process is divided into its constituent components:

- Variable cost elements: which include materials, labour, and utilities
- Fixed cost elements: which include equipment, buildings, tooling, overheads
- Cost of capital

Once the cost components for each step has been identified, costs or cost estimates are obtained from internal accounting sources as well as publicly available data to model the cost of a process step. It is not uncommon to deconstruct or reverse engineer a product to assist in generating cost element estimates for an individual manufacturing step. Refer to Figure 1 for TCM Approach.

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TCM APPROACH

After modeling the cost profile of each manufacturing step, sensitivity analysis can be performed to understand the impact of changes to key parameters. This allows for the identification of TCM model inputs that cause significant cost variability. For example, changes in annual production volume, process yield, throughput and tooling costs can be subjected to sensitivity analysis and the impact on overall cost assessed. The larger the impact, the more time will need to be spent on refining these inputs.

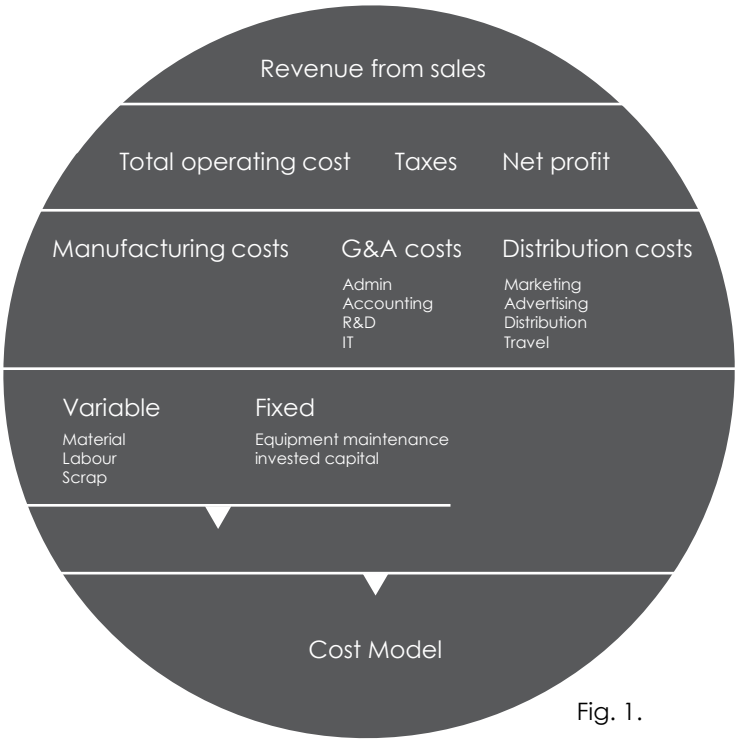

Fig. 1.

Because of the ability to conduct sensitivity analysis, TCM remains a widely used tool, with the principal benefit being the development of a robust cost model in the presence of uncertainty.

Although this model has stood the test of time, TCM has some drawbacks[2] .
The principle disadvantages are expense, input reliability and time spent on developing the model. These drawbacks are further described on the next page .

Seward E. Matwick, Economic Evaluation of sheet hydroforming and low volume stamping and the effects of manufacturing systems analysis, Masters Thesis (Feb 2003)

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TCM APPROACH

INPUT RELIABILITY:

The information needed to populate a TCM is based on public domain sources as well as best estimates (when the information is not available from public sources). Because of the highly sensitive nature of much of the input, obtaining this data (even when using competitive intelligence gathering expertise); is a challenge. As with any benchmarking exercise, the output is only as good as the input.

TIME AND EXPENSE:

Establishing a cost model requires a detailed understanding of a benchmarks' manufacturing process which takes a substantive amount of time to create and by association, money. The passage of time also rapidly dates a specific TCM analysis. If a model needs to be constantly updated, new data must be supplied to support further analysis, which is expensive to generate.

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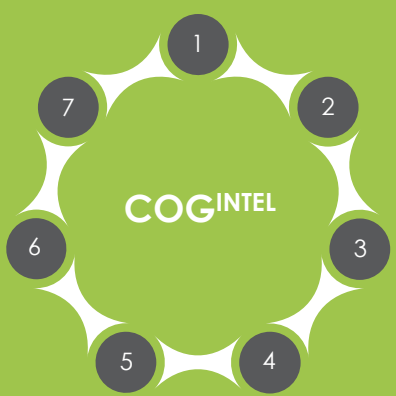
COG^{INTEL} OVERVIEW

As an alternative to TCM, Dig Worldwide has developed a quick and cost efficient methodology to benchmark cost of goods and services. This seven-step process is known as COG^{Intel} which allows our clients to benchmark their manufacturing and supply chain operations against any number of organisations in a robust, time savvy and cost saving way.

The COG^{Intel} methodology is divided into two distinct intelligence clusters: functional intelligence (Steps 1-3) and operational intelligence (Steps 4-7).

Functional intelligence outlines what is to be compared and how it is made or structured from a top down perspective. Operational intelligence then seeks to benchmark one company against another. Refer to Figure 2 for COG^{Intel} Approach.



7 **Compare** output against that of benchmark targets, highlighting performance gaps, areas of competitive advantage and disadvantage

6 **Digging Wider** Utilise Primary Research determine the ex-factory price of an equivalent unit for each benchmark

5 **Digging Deeper** Utilise Primary Research to describe and compare the fixed and variable costs of each benchmark

4 **Digging Down** Utilise Primary Research to outline and describe the manufacturing process of benchmark targets

3 **Describe** fixed and variable manufacturing costs of an equivalent unit in monetary terms across companies

2 **Define** a standardised or equivalent manufacturing unit that can be compared across companies

1 **Outline** your manufacturing process so it can easily be compared to others

Fig. 2.

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CASE STUDY USING COG^{INTEL}

For the rest of the whitepaper, we will describe the application of Dig Worldwide's COG^{Intel} methodology via the example of a die-cast wheel manufacturing case study to illustrate a number of the steps in the process.

A German manufacturer of die-cast wheels (Alpha GmbH) wanted to benchmark its manufacturing operations against an American (Bravo) and a Japanese (Charlie) competitor.

Alpha GmbH had lost several large purchasing contracts, won either by Bravo or Charlie and was concerned that its' manufacturing productivity had declined. Alpha GmbH wanted to benchmark it's manufacturing and supply chain operations against its US and Japanese competition in a robust, time savvy and cost saving way.

Step 1: OUTLINE

Dig Worldwide works very closely with its clients to understand their manufacturing process or service before looking at competitors. By understanding a client's process, it allows for the right questions to be asked of a competitor's process and to later compare them.

During this step, we will typically interview internal company sources in R&D, strategy and manufacturing in order to fully understand our client's process. This will then provide Dig Worldwide with an accurate baseline with which to compare to others.

Using the die-cast wheel case study, interviews with Alpha GmbH manufacturing and R&D employees revealed the typical process used to manufacture an aluminum wheel is outlined in Figure 3.

Fig. 3.

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Step 2: DEFINE an Equivalent Unit

Once the process has been articulated, an equivalent unit is defined, which is the keystone to Dig Worldwide COG^{Intel} methodology. To be able to compare the cost of a manufactured product or service, it has to be comparable. This is much easier stated than done.

With regards to Alpha GmbH, an equivalent unit was defined as a single die-cast wheel. This stanardised unit could then be compared across benchmarks that may use a different production method such as forging or high-pressure die-casting as well as different alloys and composites.

To further illustrate this point, Figure 4 describes the **COG^{Intel}** equivalent units Dig Worldwide has developed and used across a range of bespoke projects.

Toothpaste	A single unit of toothpaste or a volume of toothpaste	Either of these two units can be compared regardless of raw materials, unit size, dispensing method or packaging material
BioTech	A single delivery method unit or a specific amount of active ingredient	A single tablet, wafer, syringe, patch or infusion bag can be used irrespective of dose or specific amount of active ingredient regardless
Solar Power	Watt	With the speed and development and range of photovoltaic technologies, the best equivalent unit to compare one solar manufacturer against another is the watt surrogate indicator

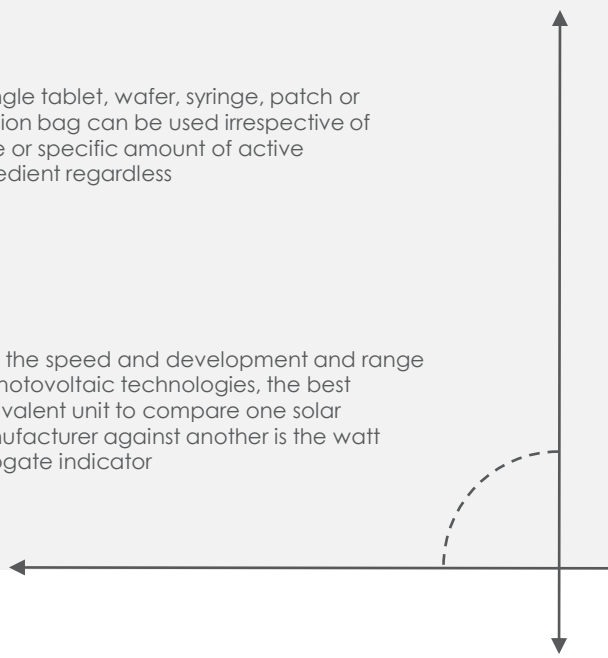

Fig. 4.

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Step 3: DESCRIBE Fixed and Variable Cost

As well as understanding our clients manufacturing processes, we also seek to understand both fixed and variable costs from a top-down perspective. Once an equivalent unit has been agreed upon, this allows fixed and variable manufacturing cost elements to be described as a percentage of this equivalent unit.

Again using Alpha GmbH as an example, by dividing the total number of wheels manufactured by total COGs for the year, Alpha's cost per equivalent unit can be calculated.

	Costs	€ Millions	€/Eq Unit	% of an Eq Unit
Variable	Materials	1.5	1.9	15%
	Labour	3.0	3.8	30%
	Utilities	0.5	0.6	5%

	Costs	€ Millions	€/Eq Unit	% of an Eq Unit
Fixed	Equipment	1.0	1.3	10%
	Building	0.5	0.6	5%
	Tooling	1.0	1.3	10%
	Overhead	2.0	2.5	20%
	Cost of Cap	0.5	0.6	5%
		10.0	12.5	100%

On obtaining actual Alpha GmbH fixed and variable cost data, we could subsequently translate these costs into percentages as illustrated in Figure 5. Thus, making cross manufacturer comparison possible.

Fig. 5.

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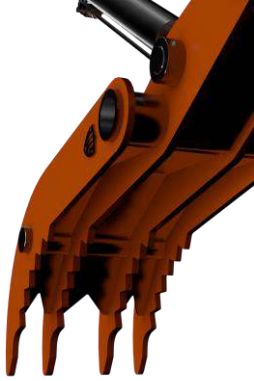

CASE STUDY USING COG^{INTEL}

DIGGING DOWN, DIGGING DEEPER, DIGGING WIDER

Using Primary Research

DIGGING DEEP	A benchmarks process and overall process efficiency metric are uncovered
DIGGING DEEPER	Fixed and variable costs are then obtained as a percentage of the cost of an equivalent unit
DIGGING WIDER	The ex-works price of an equivalent unit is then dug-up

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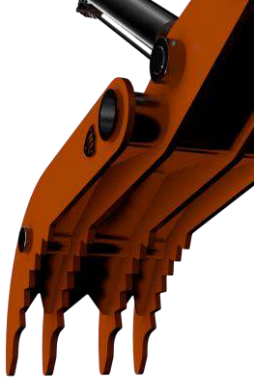

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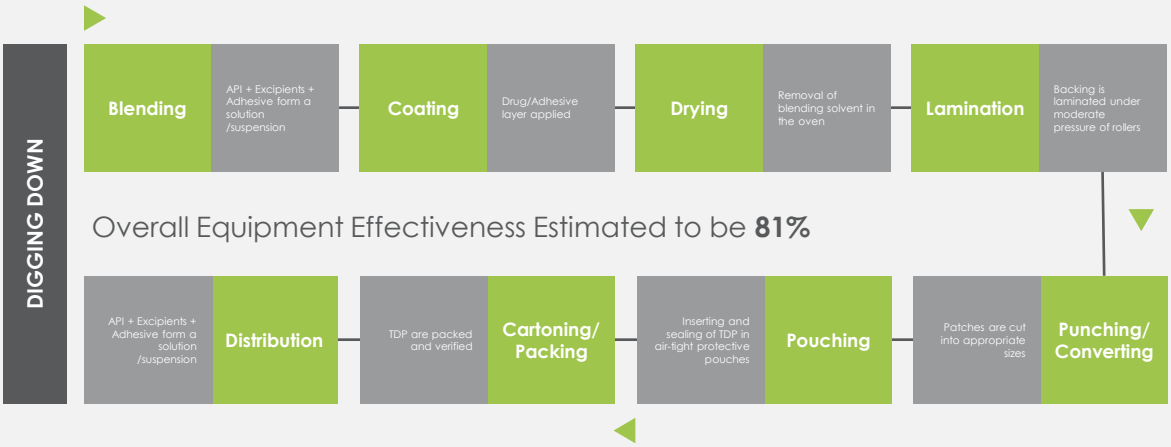
Step 4: DIGGING DOWN

An example of a Pharma TDP process uncovered by **Digging Down**



Step 4: DIGGING DOWN

Armed with an outline knowledge of a how a client manufactures a specific product, skilled Dig Worldwide analysts gather intelligence from the target companies on how they manufacture a product as well as how efficiently the plant or production line is operating. Dig Worldwide uses Overall Equipment Effectiveness (OEE) to determine how efficiently a competitor is manufacturing a product.

Back to the case study: One of Alpha GmbH benchmarks, Bravo had all of its workstations connected to its enterprise network recording cycle time, downtime and maintenance that allowed real-time OEE calculation or as stated by Bravo, it was better to rename it "Overall Foundry Efficiency".

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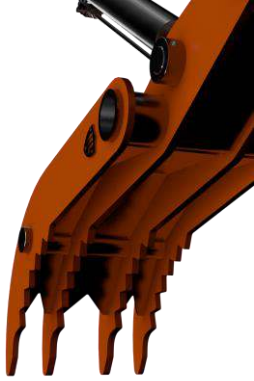

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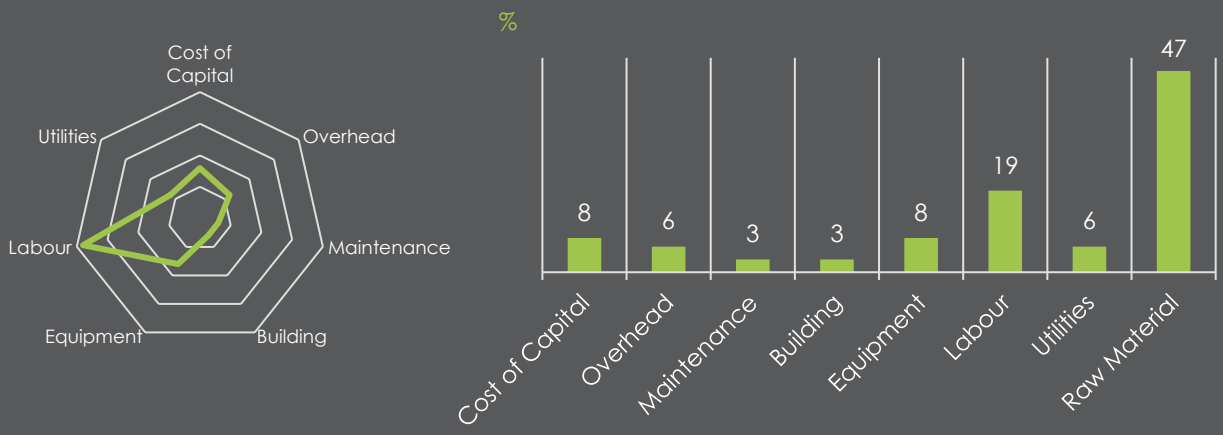
Step 5: DIGGING DEEPER

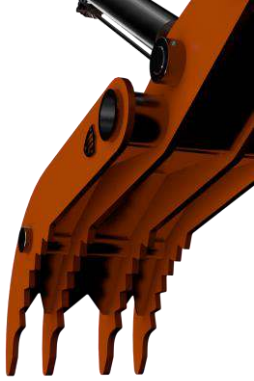
Fixed and Variable Cost Profile of an API



Once a benchmark manufacturing process has been captured and understood, fixed and variable cost intelligence is then gathered. Using the die-cast wheel example, we would ask sources employed or connected to Bravo and Charlie questions such as, 'what percentage of its cost of a making a single wheel are raw materials'. Another source might be asked 'what are the internal accounting guidelines for cost-of-capital as a percentage'. By asking a number or relevant and knowledgeable sources similar questions, a cost profile of an equivalent unit emerges.

For example, the cost of a die-cast wheel manufactured by company Bravo represents 100% with 20% of those costs being raw materials, 20% the cost of labour and 20% the costs of utilities.

Fixed costs, excluding the cost of capital represent 37.5% and the cost of capital represents 2.5% of an equivalent unit. When combined with an assessment of how efficiently the plant or production line is operating, a credible assessment of competitors manufacturing operation is generated.



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Step 6: DIGGING WIDER

The penultimate step in the process is to obtain an approximation of the ex-factory/works price of an equivalent unit. If Bravo's ex-factory cost of a die-cast wheel is €25 and the raw materials represent 20% of the cost of the equivalent unit, it will costs Bravo €5 for the metal and other composites that the wheel is made from.

Step7: COMPARE

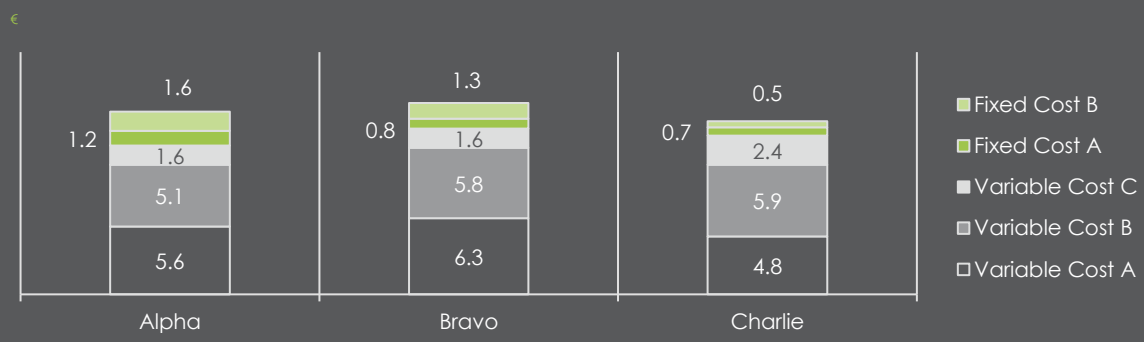

Fig. 6.

Once you have collected and documented fixed and variable COG data from all companies, it then possible to place organisations side by side and meaningfully compare the results.

COG^{Intel} will describe the process and comparative COGs as a holistic top-down cost rather than attempting to describe the costs attached to each step of the manufacturing process. For many internal company decisions, this level of intelligence and COGs transparency is sufficient.

Where manufacturing processes are very similar, it is easy to determine which fixed or variable cost elements confer competitive advantage or disadvantage. Where processes are radically different, it is possible to conclude that there is or is not a COGs advantage and to quantify the size of that advantage or disadvantage.

Moving back to our die-cast wheel case study, Figure 6 illustrates and compares the actual COGs profile of Alpha, Bravo and Charlie including a breakdown of both fixed and variable costs. As you can see, Charlie appears to have the lowest COGs of all manufacturers on an equivalent unit basis.

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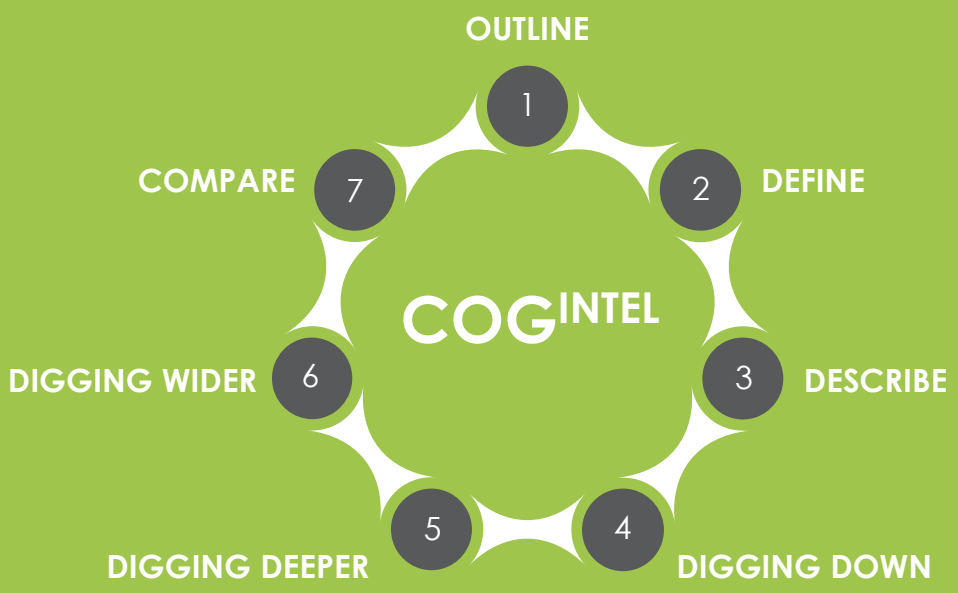
Step 7: COMPARE (Cont'd)

For the Alpha GmbH sales team, COG[Intel] allowed them to quickly focus on other aspects of the die-cast wheel tendering process, knowing that they did not have a significant COGs disadvantage. If TCM had been used, the process would have taken months rather than weeks and cost several multiples more than COG[Intel]. The results obtained were sufficient for the client to make a decision to change how they tendered for new business.

Whilst not replacing Technical-Cost-Modeling, COG[Intel] provides a rapid and cost effective alternative to businesses that wish to benchmark the manufacturing costs of existing competition.



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ABOUT DIG WORLDWIDE

Dig Worldwide is a specialist agency founded in 2011 providing back to basics primary competitive intelligence. We spend the majority of our time talking to high numbers of informed sources rather than passively searching the Internet and recycling information or interviewing only a handful of sources. Everything that Dig Worldwide does is based on asking the right questions of both our clients and potential sources of intelligence. This ensures that our efforts are focused on what matters from an intelligence gathering perspective rather than peripheral activity.

Reliability is at the core of who we are, providing a flexible yet consistent service. We always act ethically when gathering intelligence and deliver results in a thought provoking and analysed manner.

For more information, please contact us at info@dig-worldwide.com or call Beth Elliott or Tony Nagle from Dig Worldwide on +44 (0) 1304 806 988