

It's Not Like I'm My Boss' Favorite or Something, I Just Know How He Thinks

The “Business Case” is the single biggest factor influencing my boss’ decisions. He accepted more of my proposals, including the one that got us started doing CFD, once I learned how to think in terms of the “Business Case”.

Engineers will pursue great ideas just because they’re novel, slick, original, and have technical merit. But most of our managers aren’t like this. They have a different view of the enterprise and business needs. Good managers will appreciate technical merit, but their views will be balanced by whether pursuit of a new technology makes good business sense.

Our managers must determine whether the investment of the company’s resources (manpower and money) in a new technology will help increase the company’s profitability. In addition, if a manager is evaluating several new technology opportunities, he/she must prioritize them to determine which opportunities should be pursued with the available resources.

The “Business Case” is a fundamental study that compares the financial benefits of an opportunity with the investment cost of that opportunity. A good business case explores and quantifies all the costs and benefits associated with an opportunity. Frequently we’ll oversimplify the business case by only considering the obvious costs. But there can be many other benefits and ~~costs associated with an opportunity that may~~ not be so obvious. Understanding these financial measurables may require the assistance of a financial analyst. While all this may sound tedious, performing this study will help you develop a greater appreciation of your business. In addition, this exercise will enable you to more clearly identify where the real business opportunities are for your company. Of course, your boss will also be impressed.



A Number that Reminds You of Your Stockbroker

A numerical value that quantifies the business potential of an opportunity is the Internal Rate of Return (IRR). Some also refer to this as the Time Adjusted Rate of Return (TARR). The IRR (or TARR) is expressed as a percentage (%) and describes the amount of interest an investment would generate if the business opportunity was strictly an investment opportunity. In other words, the IRR for a new technology opportunity is the amount of return the company could generate if it invested that same money in a financial portfolio with the same rate of return. The IRR is calculated by comparing the cost of pursuing an opportunity (\$) versus the financial benefits (\$) of the opportunity. The financial benefits come from reduced costs and/or increased revenues. The IRR is more useful than calculating the payback period of an investment because the IRR expresses the profitability of an opportunity long after the initial investment cost has been paid off. The IRR is also useful for prioritizing several different project proposals. IRR can be calculated using the Excel function **IRR(values, guess)**.

The IRR that a company considers acceptable varies with each company and can also vary

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depending on the company's financial condition. In addition, a company may inflate the target IRR (they won't fund an opportunity if it's below their designated target) to compensate for the "optimism" of their engineers. For example, some large companies use a target IRR of 25-30% during good times. This can increase to 100% during tough times when the company has less money to spend on new technologies. Even a 25% IRR means the company will achieve a 25% rate of return on their money if the opportunity produces as many benefits as the engineers predict. You'll have a hard time finding a financial investment as good as this.

How to Justify Doing CFD: The CFD Business Case

As an example of developing a business case, let's suppose your company is thinking about getting into CFD. You begin developing the business case by quantifying the costs associated with getting started with CFD. In general, determining the costs is pretty simple. For the following analysis we'll assume one of your existing engineers (could be you) will be doing the CFD. Consequently, engineering salaries are not included in this example.

First Year Costs (Traditional general purpose CFD software)

UNIX computer workstation	\$ 15,000
CFD Software (1 License)	\$ 25,000
3 rd Party Mesh Software (1 License)	\$ 10,000
Total Initial Investment Cost	\$ 50,000

Subsequent Year Costs

CFD Software license	\$ 25,000
3 rd Party Mesh Software maintenance	\$ 2,000
Year-to-Year Costs	\$ 27,000

Calculating the benefits (savings and increased revenues) associated with doing CFD is more difficult because they are specific to your business. For example, doing CFD may help you save prototype testing costs. These costs will include test time and the manpower needed to run the tests. Maybe CFD will help give your product a more competitive position in the marketplace and you'll expect your market share to increase (along with increased revenues). If you're in manufacturing, using CFD may help you eliminate problems during the new product launch process. Having fewer problems to solve during the launch process will save your company money.

The primary point here is that you'll need to understand the links between CFD and savings and revenues that result from doing CFD in order to estimate the benefits you'll achieve by getting into CFD.

In this example, we can achieve a 30% IRR after five years if CFD helps save and/or increase revenues by \$ 50,000/year. This assumes that in the first year you won't achieve any financial benefits (savings or increased revenues) because you're learning during this time. But in years 2-5 CFD helps you save \$ 50,000 per year or increases your revenues by \$ 50,000 per year (or any combination of the two). If the benefits drop to \$ 40,000 per year, the IRR after 5 years is only 2%. This suggests the IRR is pretty sensitive and you need to do a good job estimating the benefits.

If you need a 30% IRR (after 5 years) to get approval to invest in CFD, but don't think you can achieve \$ 50,000 per year in increased savings or revenues, the only other way you can achieve the IRR target is to reduce the investment and/or on-going costs. We can perform this exercise by exploring the options to license SC/Tetra CFD software. SC/Tetra is full general purpose CFD software that offers equal or greater functionality than its competitors, such as FLUENT or STAR-CD, but at much lower cost. Because SC/Tetra is PC Windows based, it will run on a lower cost PC instead of an expensive UNIX workstation. In addition, because SC/Tetra has built in mesh

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diagnostics and repair functions, 3rd party software is not needed to perform these operations.

First Year Costs (SC/Tetra CFD Software)

PC Computer (SC/Tetra runs on a PC)	\$ 5,000
SC/Tetra CFD software license	\$ 15,000
(No 3 rd party mesh diagnostic/repair software is necessary because this functionality is included within SC/Tetra	
Total Initial Investment Cost	\$ 20,000

Year-to-Year Cost (Software license) **\$ 15,000**

	Traditional General Purpose CFD Software	SC/Tetra CFD Software
Initial Investment Cost	\$ 50,000	\$ 20,000
Year-to-Year Cost	\$ 27,000	\$ 15,000
Savings or Increased Revenues to produce 30% IRR after 5 years	\$ 50,000	\$ 24,250

In this example, we can substantially reduce the amount of benefits required to achieve a 30% IRR by using SC/Tetra software rather than a traditional CFD software package.

The point of this exercise is not to sell you CFD software but to show you how to perform a business case. As you can see this is not a trivial exercise and it will help you better understand the nuts and bolts of your business. This isn't always something highly technical engineers want to do. However, if you can learn to think in terms of the "Business Case" your value and success within your company will surely rise. Try it and see if your boss isn't impressed.