In this article, the authors cover tools for financial modeling. Commonly used time lines and cash flow diagrams are discussed. Commonly used but limited terms such as payback and breakeven are introduced. The important topics of the time value of money and discount rates are introduced to lay the foundation for their use in modeling and in more advanced metrics such as the internal rate of return. Finally, the authors broach the more sophisticated topic of net present value.

Key Words: Finance, accounting, revenue, cash, management


INTRODUCTION

In this article, we introduce basic concepts from the realm of finance and accounting. Using these concepts may affect how you look at a wide spectrum of decisions, from purchasing a house to leasing a car or buying long-distance service. We provide examples from our own practices demonstrating how these business tools can be used (and also misused if not well understood) in making decisions. The goal of this article is not to imply or propose that a radiologist should become an accountant or international financier. Rather, it is to provide radiologists and other readers with a better basis to communicate with, lead, and manage the business and financial personnel with whom they will inevitably work to a greater degree in the near future.

FINANCIAL MODELING AND DISPLAYS: TIME LINES AND CASH FLOW DIAGRAMS

One of the most common challenges in running a business is setting up a business plan [1]. Probably the most critical part of a business plan is the financial projections, or pro forma (predicted financial performance displayed in projected future financial statements of a new business venture). This is done over a time horizon and maps out when and to what degree cash either leaves an enterprise as it is paid out or flows into the coffers from revenue. Depending on the institution and situation, this planning horizon can be as short as a year or in some cases up to or even over a decade. Financial modeling is usually done on a spreadsheet and is often displayed graphically as a time line or cash flow diagram, with inputs and outputs marked as they are likely to occur. For a venture to be successful, the value of the cash coming in clearly has to exceed the value of that going out. The critical subject of how to compare the value of cash now versus cash in the future will be discussed in depth.

An example is provided in Fig. 1. This shows a typical investment of the kind we often do in imaging. There is a large up-front investment (the down arrow at the beginning of the time line) and then a resulting revenue stream over time (the up arrows that follow). Obviously, these are estimates, and one of the keys to great planning is getting the best information to create accurate projections. A common question that arises at this point is the appropriate length of a planning horizon. The answer should cover the likely useful economic life of an investment and also take into account your ability to realistically make estimates or scenarios on the basis of decent information.

Sometimes this is fairly straightforward. For example, if you are leasing a machine that you are likely to keep through to the end, then the lease length is a reasonable choice because it covers the macroscopic period affected...
BUSINESS PLAN

HANDLING UNCERTAINTY IN THE BUSINESS PLAN

A very important issue in doing projections is handling uncertainty. Because we can’t really predict the future, what a plan really does is provide a best projection on the basis of estimates. Every entry in your model is an estimate of an amount (and also often of the time that it will occur), and therefore, the projections and any metrics that you derive from them carry along this risk and uncertainty. An interesting feature is that not all risk is necessarily bad. If you overestimate a future cost to your organization or underestimate income, then those turn out to be good risks, even though in everyday parlance, we usually use risk only in a negative sense.

Although everyone handles this problem differently in putting together a plan, most planners and budget offices use different scenarios to handle the range of uncertainty in a plan. These usually include the most likely scenario, based on your best estimates. Most modeling also involves developing additional projections including both better-than-expected and worse-than-expected scenarios. Financial forecasting is often done with a trio or so of discrete models, but bear in mind that there is obviously a spectrum of intermediate possible outcomes as well. First-time planners often immediately jump to focusing on the vaunted “worst-case scenarios”: an earthquake.

Fig. 1. This illustrates a time-line approach for illustrating capital flows in a simple investment case, with time zero on the left and time subsequent going to the right. The initial down arrow is a capital outflow or investment in a new center. The subsequent up arrows illustrate revenue (or, better, cash) inflows that result from running the imaging practice.
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