Tom Copeland is not the only author who claims that in R&D intensive companies most of the company value lies in the terminal value, i.e. that the main chunk of value stems from the time period beyond the estimated cash flows. Usually it is assumed that from then onwards the company is able to maintain stable annual cash flows. These stable cash flows are then summarised in the so-called terminal value. If this terminal value is more than 100% this means that the company would be an unprofitable venture if we don't include the cash flows of the time period we do not analyse in detail. Probably nobody who invests his own money would like to rely on such assumptions. In life sciences terminal value has also another shortcoming: terminal value assumes a fair degree of stability of the company. But drug development projects are subject to a large amount of attrition and it is very difficult to estimate when a company will have reached a stable state. A stable state corresponds to a healthy pipeline that is able to compensate for attrition. Will the company really be already that far by then? Even pipelines of big pharma companies do not have this property. Is, e.g., Pfizer's pipeline strong enough to compensate for the loss of patent protection of Lipitor? We propose an alternative methodology to capture the value of the company's ongoing business: Add every year new projects to the pipeline. These new projects, more or less standard projects, come from business development (in-licensed projects) or from the labs. We can estimate this feed rate by looking at the past performance of business development and research of the company. This way the rather delicate estimation of the moment when the company reaches a stable state is not an input but rather an output. You find a more detailed description of terminal value and why it is dangerous to rely on it in our September 2008 newsletter. If we set the time horizon at ten years then the terminal value is US$ 50 Mio and the overall project value US$ 39 Mio. A surprising match with our initial rNPV valuation, and also surprisingly close to Copeland's figure (here the terminal value is 129% of the value). However, if we push the time horizon to 12 years then the company value already becomes US$ 49 Mio. But the value of the company should not depend on our time horizon.

Value=DCF without success rates (because compounds are not comparable) but discounted at 50%.

We often see this valuation practice being used for early stage companies. A Harvard business school article by William Sahlman ("A method for valuing high-risk, long-term investments", 2003) gave this method the apparent academic justification. The discount rate is decomposed into various components that account for risk, liquidity, added value by the investor, and cash flow adjustment because of uncertain business outcome. While we completely agree with the first two components, i.e. risk premium and liquidity adjustment, we object to the other premiums. The argument for the value added premium goes as follows: The investor adds his experience to improve the performance of the company. This

premium can be avoided by estimating the cash flows for the pre-money valuation (which is also pre-investor, i.e. without his valuable input) without the value adding effect of the investor and his network. This is less arbitrary than a premium to the discount rate. The cash flow adjustment should account for the attrition. We think it makes much more sense to use success rates instead of a higher discount rate. Success rates are available for any disease area, for any compound type, and for each phase. Success rates allow differentiating between safer and riskier therapeutic areas. A premium to the discount rate lacks a clear quantification. How much should this premium be for a preclinical cancer compound compared to a phase II Alzheimer drug? Finally, cash flows after launch of eth drug have the same probability. It is unclear why nevertheless with every additional year the cash flows should be worth about 50% less. For the sake of transparency and credibility of the valuations we strongly argue to quantify (finally valuation is a quantification exercise) the impact of each effect. But these effects should rather have an impact on the cash flows than on the discount rate whose effect on the overall valuation is difficult to judge. Our example company now has a value of US$ -2.6 Mio.

In the continuation we exhibit a few even more adventurous valuation methods:

Comparables

A so-called valuation specialist tried to find the value of a company by comparing it to companies whose price is known (e.g. the market capitalisation) based on the number of PhDs: Companies are comparable if the number of PhDs is about the same. Unfortunately not each technology requires the same amount of research, and not each researcher adds the same value. Although completely meaningless, the number of PhDs seems to be a well observable parameter that our colleagues happily used, because more value-relevant parameters were hard to get. We could also cite other meaningless parameters like P&L, amount of burnt capital, etc. Comparables are a well-accepted method for price finding, but it should use criteria that are indeed value-relevant. Such criteria can be stage of lead compound, same therapeutic area, similar technology, or same business model.

Value=#employees*US$1Mio (business development of a private biotech company)

This valuation method falls into the same category like the one just above. If it were that easy we would recommend that you hire a few 1,000 employees. This way you boost your value by US$1bio. Our example company would be worth US$ 50 Mio.

Post-tax value=(1-tax)*Pre-tax value (European investment bank)

This tax consideration is correct for companies that are profitable (and remain so). But for companies, which are not yet profitable the effect is actually worse, because they can only realise their tax assets once they reach

profitability, without interests. And for companies that become profitable only in some cases (like biotech) the value destroying effect of taxes is even more devastating. We have discussed the impact of taxes in our May 2008 newsletter. In the example the post-tax value is US$ 25 Mio, only 64% of the pre-tax value. The described method assumes a post-tax value of 75% (=100%-25%) of the pre-tax value, i.e. US$ 29 Mio.

Value=invested capital compounded at target IRR. ("valuation specialist")

This method puts a lot of trust into the management of the company. It assumes that the management could increase the company value at the target IRR since inception regardless of what actually happened. It is clear that the valuation depends on the current situation of the company and its future outlook; the past is irrelevant for the company value.

Value=DCF without success rate * success rate (Analyst)

This analyst valued each project without success rates but then felt that he had to adjust for the attrition rate of the projects. Consequently he simply reduced the value by the success rate of the project. This risk-adjustment is wrong. In biotech the value reducing investments are unfortunately more likely than the value adding positive revenues from sales. This means that the value suffers more than just by the success rate if you correctly adjust the cash flows for their risk. The example company would have a value without success rates of US$ 240 Mio. Multiplying this with the success rates (*40%*60%*90%) this would lead to a value of US$ 52 Mio.

Another popular method amongst analysts is the dynamic P/E ratio and also receives a honourable mention in this list. It has been discussed in detail in our July 2008 newsletter.

Method	Value (US$ Mio)
rNPV pre-tax	**39**
rNPV post-tax	**25**
Real options at risk free	187
with pharma discount	112
Terminal value	39-49
50% discount rate	-2.6
1FTE=US$1Mio	50
pre-tax*(1-tax)	29
risk adjustment	52