

## Scenic Video Transcript

### Measurement Decisions

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#### Transcript

In the scenic route for recognition decisions, we saw that measures could be dispersed to varying degrees depending on the context. In particular, the fair value estimates of buildings were dispersed more than the fair value estimates of marketable securities and yet the fair value estimates of buildings were dispersed less than the fair value estimates of environmental liabilities.

Now, we want to extend this concept of measurement decisions in this chapter, and one of the things we're going to see is that fair values are not the only measurement objective. In fact, we're going to be looking at value in use, net realizable value, and adjusted historical cost. And we will be developing several examples to illustrate these concepts. That's important because when we look at the company disclosures for Qantas, Southwest, and British Airways, we're going to see that all of these measurement objectives are used for various assets and liabilities across the balance sheet. And thus to interpret the numbers you're looking at, that is, to understand the accounting and how it connects to the underlying business activities, you need to understand these concepts. Let's get started.

#### Terms and concepts: Measurement decisions

We're going to start by looking at some measurement decisions we'll consider in great detail later. Assume a company purchased a building 5 years ago. What did the following measure today? The building's fair value, the building's net realizable value, the building's value in use, the building's historical cost adjusted for depreciation and impairments? Now, we'll be



looking at all these in this module. But in fact, what we're going to discover is that all these valuations could play a role in the numbers that are reported on balance sheets.

So as we look at these different measurement objectives, and we'll define what we mean more precisely by measurement objectives shortly, how can they be measured? That is, how do we go about measuring them? What information is needed and for what decisions, if any, would the resulting measures be relevant? What would determine the reliability of the measures? Remember, if we're trying to determine how useful the numbers are to our decisions, we must assess the relevance and the reliability. So, we want to look at just how we go about doing that.

Let's start by defining measurement. Measurement is the process, and that's critical, it's a process, of determining the monetary amounts at which elements of the balance sheet and income statement are to be recognized. Measures, as distinct from measurements, are the outcomes from this process. A synonym for measurements is "estimates."

What are measurement decisions? Well, they determine the acceptable measurement objectives, scopes, methods, and inputs from those that meet the recognition criteria. Now, we're going to define what we mean by objectives, scopes, methods and inputs, but the key point here is that several of these can meet the recognition criteria. And then one or more decision makers in that decision hierarchy we looked at in the first scenic video, has to determine just exactly which of these scopes, objectives, methods and inputs are companies going to follow.

We begin with some definitions. First of all measurement objectives: These are the things that are being measured, for example the fair value of a building. Measurement methods: The formulas or techniques used to estimate these objectives. Measurement inputs: The inputs needed to apply these methods; what do you put in to get the output. Measurement scope: The items combined for a single measurement. So for example, do we measure the bad debt allowance for a particular receivable or for a portfolio receivables? The answers can be different depending on how we go about setting the unit of analysis.

Here are some synonyms you're going to see frequently as we look through financial statements. For measurement objectives commonly we'll also see "measurement attributes" or "measurement basis." These are all synonyms. For measurement scope, we'll see the term "unit of account." This is a relatively new term, but standard setters are using it increasingly.

Here are some common measurement objectives that we're going to be looking at in this module: Fair value, realizable or settlement value, value in use, adjusted historical cost. Well, let's get started with some definitions and examples.

## **Fair value**

**Fair value:** If you saw the scenic route video on recognition, you already know what fair value is. Fair value is the amount which an asset could be exchanged, or a liability settled, between two knowledgeable willing parties in an arm-length transaction. So essentially, it's what the company could sell the asset for to an unrelated party.

Here's an example. We're going to start with the measurement inputs - what's going to go into the measure. These are really just the facts we need to complete the measurement. A company purchases a new building for \$20M on January 1, 2009. On December 31, 2013, the building is still in good condition for its age. On this same day, the average price of a comparable building sold recently was \$21M. Now getting that average price could require significant judgment depending on the availability of comparable buildings, but we'll put that aside for now.

What's the measurement objective? Determine the building's fair value on December 31, 2013. What's the measurement technique? Well, we're going to look at the average price of comparable buildings sold recently. We've assumed that the average price is \$21M so the estimated fair value on that date is \$21 M. Again, the key here is "Get the vocabulary down."

What's the difference between an input to a measure and a measurement objective and a measurement technique? The average price of comparables and the measurement objective, the fair value, and then what is the measure itself, which is the outcome of all this.

So let's look at the relevance and reliability of fair values. These are the things you have to determine when you're looking at numbers that are reported at fair value.

An asset's fair value measures its future benefits to an unrelated party and a liability's fair value measures the amount it could be settled for by an unrelated party. Fair values are particularly relevant for estimating the proceeds that could be raised by disposing of the assets. So, if we're looking at a company and we're asking, what could they get for that airplane if they were to turn around and sell it? For example, if they were about to go into bankruptcy, what would the airplane be worth? At that point, the fair value would be highly relevant because we want to know exactly what they could get for it if they sold it.

They are also relevant for establishing a lower bound on the value an entity should expect to generate by using rather than selling the assets. So, if we thought that the fair value of an asset was \$100 but the value in use, that is, the value the company could get by using the asset, was \$90, then for sure the company should sell the asset because they could get more by selling it than they could by using it. So, the fair value creates a lower bound on what the company should get by using the asset.

Having established the relevance of fair value estimates in these two situations, how about their reliability? Well, the reliability of fair value estimates generally depends on the extent to which the same asset or similar assets are traded in orderly markets. However, you can estimate the fair value through other measurement techniques besides looking at market prices.

## **Value in use**

Value in use: What do we mean by value in use? Well, value in use is the present value of an asset's expected future benefits, assuming the entity will use the asset. Now, present value is a valuation technique. We're not going to describe it in great detail here, but let's suppose that we had an asset and it was going to bring in values of \$15, \$15 and \$15 for three years. And then at the end of the three years, we'd sell it and we'll get say \$25 for it. Well, if we looked at the future value of that asset, we just add up these numbers, \$15, \$15 and \$15, which is \$45 and \$25 more makes a grand total of \$70 of future value. And what would we be

willing to pay for that asset today, that's its present value, if it's going to give us \$70 in the future? All you need to know right now is that we'd be willing to pay less than \$70 and there are formulas that will help us get that number. So, by present value today, we mean what is the maximum we'd be willing to pay today to get that asset.

If the value in use of an asset can't be measured separately from the value in use of the entity's other assets because of interdependencies, the value in use of the smallest group of assets that are largely independent of the entity's other assets is measured. This is called a "cash generating unit." This is an important concept and we're going to see it in the company disclosures later.

Think about it - value in use. So, we're looking at what's the value of a particular asset in use. Well, in use with what? Perhaps in use with other assets and this often happens. For example, suppose we're looking at a factory and we're looking at an assembly line, and there are three pieces of equipment in the assembly line. And we want to look at the value in use of the middle piece of equipment and products are created by moving them down this assembly line. Well, we can't figure the value in use of this piece of equipment without considering the value in use of the entire assembly line and possibly the entire factory. Why not? Because this particular unit doesn't generate cash flows on its own. Products are created on the entire assembly line and then sold through.

So, when we talk about value in use, it's a very important distinction between that and fair value. We can calculate the fair value of this asset if we can get reliable benchmark measures from a market, say. But we can't calculate its value in use given the facts that we've established here, not by itself. So, we put that asset into the smallest group of assets for which there's actually cash coming into the company, and that's called the "cash generating unit".

This concept is remarkably important because value in use is what investors would really like to know. If you think about what an investor is trying to do, they're saying well look at the entire company not just this cash generating unit, but all the cash generating units, put them together and we'd like to know what the company is worth. Well, that's how much value they can generate from using all those assets together.

And it's going to be valuable for investors to look at particular cash generating units and what they're worth, particularly, for large global companies. So, if you take a company like Siemens, it has a large medical products business. Investors would like to know, for that cash generating unit or even smaller cash generating units within the medical equipment business, they'd like to know what is the value of those individual cash generating units, so they can compare those values to competitors that are also in that same industry and then do that for all the various cash generating units within Siemens. Now, they can't do this perfectly, but it's exactly why cash generating units are such an important concept.

Now having said the relevance of these measures, the reliability is something altogether different because measuring values in use are really difficult. First, you have to calculate the cash generating unit. Well, then you still have to go about calculating the value that is going to be received from that cash generating unit.

So let's look at an example and we're just going to go over this in broad terms because we've already shown how challenging it is. Suppose you wanted to determine the value in use of

the patent for one of Intel's recently released microprocessors. What would you have to do? Well, the measurement technique first; it breaks down into two steps. First, you'd have to identify the smallest group of assets that include the patent and generate cash inflows that are largely independent of Intel's other assets. Well, at the very least, that would take property, plant, and equipment and namely the factories in which the chips are built. Second, forecast the future cash flows associated with this cash generating unit and determine their present value. Well, all we want to say right now is this is challenging to do reliably in almost any business context and yet, it's highly, highly relevant. So, here, we see one of those tradeoffs between reliability and relevance.

Let's summarize what we just said. Value in use is a highly relevant measurement objective, especially for sophisticated investors who are trying to measure the value in use of the entity's net assets. The reliability of value in use estimates depends on the availability and suitability of objective historical data for predicting future performance. Now, think about how different that is from fair value estimates. If we want to estimate the fair value of a building or any other asset, what do we do? Well, we look for benchmark data, we look for what it could be sold or what comparable assets are sold for. Because what we really care about is what is it worth in someone else's hands.

Value in use is just the opposite. We can't look to what its value is in someone else's hands. What we care about is, what it's worth in the company's hands. And to do that we have to look at historical data. Well, if we look back over the past history, the company bought an asset, made projections, how well did they do against those projections, how accurate were their estimates in the past relative to how things turned out. And that gives us an idea of their ability to predict value in use. Much tougher challenge trying to assess the reliability of value in use numbers and a very difficult measurement challenge and the benchmarks are totally different. Looking at historical experience rather than looking at current benchmarks either markets or other comparable assets.

### **Net realizable value**

The next measurement objective is net realizable value. What is net realizable value? An asset's net realizable value is the cash or other proceeds an entity would receive from disposing of it in an orderly transaction, net of the costs to prepare and execute the disposal. Now, net realizable value is similar to fair value, but it presumes that there is going to be a cost to prepare the asset and dispose of it.

So, here's an example that'll help you out. Suppose a company purchases a new building for \$20M on January 1, 2009; same facts as before. But now suppose that painting the building to prepare it for disposal will cost \$100,000, selling cost will cost \$600,000 perhaps real estate fees. So, we have \$700,000 worth of costs to actually sell the building, and when we sell the building we're going to get \$21M as we did before. So, we've got a building, but it's not quite ready to be sold and if we sell it, we're going to have to pay something to get rid of it.

So what's the measurement objective? Determine the building's net realizable value at the end of the year. Measurement technique? Take the average price of a comparable building sold recently, adjust it for cost to prepare and sell the asset. So what do we get for the estimated net realizable value? \$21M minus \$0.7 M, which is the \$700,000 or \$20.3 M.

So, let's look at the relevance and reliability of net realizable or settlement values. The net realizable value and fair value objectives differ in that the net realizable value takes into account the cost to prepare an asset for disposal and execute the disposal. Thus, net realizable values are more relevant than fair values in situations where preparation and disposable costs are significant.

### **Adjusted historical cost**

The next measurement objective we're going to look at, and we're going to look at it extensively, is the adjusted historical cost. This objective was used for measurements across the balance sheet almost exclusively up to about 20 years ago and increasingly, fair values, value in use and the other values are beginning to also be used. So, we need to understand adjusted historical costs. What are they?

An asset's adjusted historical cost is its historical cost less accumulated depreciation or amortization, to be defined shortly, where relevant, and accumulated impairment losses. Now, this is really a big mouthful and we're going to spend a lot of time developing each of these terms right here.

Right now to preview that, let me say that if there are no impairment losses, and we'll tell you what they are in a minute then basically, adjusted historical costs are just historical costs adjusted for accumulated depreciation or amortization. What does that mean? Well, it means that they're based strictly on historical data. As soon as we bring in accumulated impairment losses, what we get here is kind of a blend of pure adjusted historical cost, value in use and fair values. And that's one of the reasons we're going to go in great detail here because we're going to be able show you how all these measurement objectives are actually measured through a detailed example.

As we do that, we're going to be using the term "carrying value." What do we mean by carrying value? Well, it actually pertains to all the measurement objectives and not just the adjusted historical cost. It's the amount recognized on the balance sheet for an asset or a liability. So, if its assets or liabilities measured at fair value, the carrying value is the fair value. If it's measured at adjusted historical cost, that's the carrying value. A synonym is "book value," we often refer to the book value of an asset.

Here are some examples of carrying values. Net realizable value, which is sometimes true for inventories we'll see later in the company disclosures, and adjusted historical cost, which is going to be true for several assets on most companies' balance sheets.

What we're going to do is we're going to break down adjusted historical cost into several components very slowly, introducing one component at a time.

We begin with what is an asset's historical cost? Well, it's the cash or other consideration given to acquire an asset and ensure it's ready to use. So, it's what you paid for it and then what you have to pay in addition to get it ready for use.

Here's an example we'll be extending throughout our study of adjusted historical cost. Berger Properties purchases a building for \$90M on January 1, 2009. So, \$90M is the historical cost of this building they purchased.

## Useful life

The next concept we want to look at is the asset's expected useful life. This is the length of time an entity expects, and that's very important, estimates, an entity expects to have use of the asset.

Here's an example. When Berger purchased the building, its expected useful life was 15 years. The building's expected useful life is a forecast at a point. Think of what they're doing here. We plan to keep it for 15 years. Now, it could be 14 years in the end, it could end up being 16 years, it could end up being 3 years, who knows? But our best forecast when we buy it is that it's going to be 15 years and they're going to have to revisit those forecasts in the future.

## Residual value

The next concept is what's called the expected residual value - the net realizable value expected to be received when an asset is disposed of at the end of its expected useful life. Berger purchased the building and it expected the useful life to be 15 years and had thought at the end of that 15 years, they'd get back \$30 M. So, bought it for \$90 M, historical cost, but in 15 years it expected to get back \$30 M. The building's \$30M expected residual value is a forecast that can be revised at any time.

What makes this accounting interesting and relevant is that, these revisions happen periodically. In the back of your mind as we're going through this example, begin to think about the period 2009 through 2010 when there was an economic crisis going on. Did companies change their expectations about residual values, did they think their property was going to be worth less with the economy beginning to sink? Well, in some situations, we'll see the answer is yes and that led to significant revisions.

## Expected future benefits

The next concept is called expected future benefits. When Berger purchased the building, it expected to receive \$15 of benefits each year during the asset's useful life. We know the historical cost was \$90 M; they paid \$90M for it. They think they're going to get back \$30M at the end of 15 years. So what are the benefits they're going to get having laid out all this money?

Well, they're going to get \$15M they expect each year, year 1, year 2, all the way through they're going to get that for all 15 years. So, if we looked at the future value, it would be 15 times 15, which is 225, plus 30. So, they expect to get \$255M worth of future value for something they paid \$90M for today. Well, that's a good deal if the present value of the asset that we'd mentioned earlier, is more than \$90 M. Again, we'll come back to that concept later in the book in great detail.

## Depreciable amount

The next concept is the expected remaining depreciable amount. Again, that's a mouthful so let's break it down. This is the total depreciation an entity expects to record over an asset's expected remaining useful life. This concept is pretty simple when you first get the asset. When an asset is acquired, that is when you first purchased it, its expected depreciable

amount is its historical cost less its expected residual value. Thereafter, its expected depreciable amount is its carrying value less its expected residual value. We'll demonstrate this later as we move through the life cycle of Berger's asset.

But for now, let's look at what Berger recorded as the expected depreciable amount when it acquired the asset. So when Berger acquired the building, its expected depreciable amount was \$60. How do we know this? Well, we know the historical cost was \$90 and we know the residual value was \$30. So, what Berger has to do is depreciate \$90 down to \$30, or at least that's what it expects to do over the 15 years. That's called the "expected depreciable amount". So you start out with the value of \$90 on your balance sheet, you want to end up with the value of \$30 so you've got to reduce it by \$60 and you've got to do that over 15 years.

### **Period depreciation**

What is period depreciation? Depreciation is the systematic allocation of an asset's depreciable amount over its useful life, such that the allocation reflects the pattern in which the asset's future economic benefits are expected to be consumed by the entity. Wow, that's another mouthful. Let's make it intuitive.

Let's look at the example for Berger. Remember, Berger's expected benefits are the same each year. It expects to get \$15M back in benefits each year and then it has a residual value of \$30M at the end. So, what we say is Berger's benefits are straight line, they're even. When Berger acquired the building, its expected depreciation will be \$4 a year. Why? Well, because the benefits are flat over time, the depreciation will be flat over time because we're going to allocate the \$60 of depreciable amount over that 15 years. Remember, that's the amount we have to depreciate. We're going to allocate it pro rata to the way the benefits are achieved. But the benefits are a straight line so we're going to take the \$60 and allocate it straight line. How do we get to \$4? 15 years and we've got \$60 to depreciate, so \$4 a year. Now, this is the expected depreciation.

Notice we keep writing the word "expected" depreciation, "expected" benefits, because this is what we think is going to happen when we purchase the asset upfront. But remember, the expected residual value can get revised throughout time, the expected useful life can get revised and of course the expected benefits and their pattern can get revised. So, we may end up recording different depreciation if we revise our estimates over time, and that's what can happen during the life of an asset.

Now, we want to introduce some terms here that are similar to depreciation. Consider amortization. Sometimes amortization is actually a synonym for depreciation and by sometimes, we mean in some countries, you'll hear folks say amortization when someone else might call that depreciation. In other times, depreciation refers to usage of tangible assets such as property, plant, and equipment, that is, assets you can put your hand on and amortization used for intangible assets such as intellectual property. Given these differences around the world, you have to look in context to try to determine what it is a company means by amortization and depreciation. And generally, they're conceptually quite similar whether it's depreciation or amortization. So we won't think too much about that going forward.

Depletion, on the other hand, is similar to either amortization or depreciation, but it pertains to natural resources. So if a company buys a mine, say a gold mine, and then they begin to use that gold mine over time, that is, take the gold out of the mine, then they'll deplete the value of the asset, because as they pull value out, it won't be worth as much.

### **Measurement uncertainty**

Now, this scenic route is all about measurements so we want to look at the uncertainty related to these measures. We referenced this earlier, but let's make this firm now and let's try to tie it back to those curves we looked at in the recognition video.

First of all the expected life, we estimated it to be 15 years, but experts' estimates will be dispersed around that 15 years. Here we've shown this amount of dispersion, but in other business contexts, there could be significantly more dispersion or significantly less dispersion. And the amount of confidence that we're going to put in the depreciation numbers we're seeing is going to be based on the level of this dispersion we perceive, also the expected residual value. Think about what you're trying to do here.

Consider, for an example, an airline. They might buy an airplane and say, we're going to hold that airplane for 20 years. And then they're trying to estimate what it's going to be worth 20 years from now. Well, clearly, there can be a fair amount of dispersion in what experts might think the airplane is going to be worth 20 years from now. And airplanes are traded in the market so we have very good data there. Imagine what the estimates are like for assets that are not traded so regularly.

The expected future benefits: Well, here there are all sorts of risks and uncertainty. Will the company be able to sell its products, for example? Will they get the benefits back that they expected when they bought it? Here again, the amount of uncertainty could be the same as for the other factors that we're looking at going into these measurements, but it could be totally different. As soon as there's uncertainty in all these factors going into determining the expected depreciation, well, that means that if we have to do revisions on any one of these estimates down here because we get information that moves our estimates, then depreciation will change. We're going to see that shortly. But for right now, we just want to show you that this is where the judgment comes in and measures. This is where companies have to make decisions and these are really challenging judgments in some business context.

### **Accumulated depreciation**

The next concept we wanted to introduce is that of accumulated depreciation. Now, in the "What Do I See" module, we talked about accumulated depreciation when we looked at companies' balance sheets and we saw their property, plant, and equipment was recorded at cost net of accumulated depreciation. Now, we're ready to show you just exactly what accumulated depreciation is. It's the total depreciation recorded as of a balance sheet date for an asset.

When Berger acquired the building, it expected to report the following accumulated depreciations: Now, we can see these quite simply. Here's the depreciation they expected to record each year, \$4, \$4, \$4. Here was the historical cost, \$90. What was the accumulated depreciation? Well, at this balance sheet date, they had already recorded \$4 of depreciation

so the accumulated depreciation was \$4. At the second balance sheet date, they started out with that accumulated depreciation, but they added \$4 more down here. So now they had \$8 of accumulated depreciation and of course then \$12 at the next balance sheet date and \$16. So depreciation is measured over a period, but accumulated depreciation is the amount at a point in time that is accumulated from all prior periods.

Now, the expected carrying value of an asset is going to be its historical cost less its accumulated depreciation. So for example, we started out with \$90 of historical cost and our accumulated depreciation was \$4 at the end of the first balance sheet date. So it was \$86 worth of carrying value and \$82 worth of carrying value at the next balance sheet date because the historical cost had not changed. Remember when we were looking at the disclosures for companies, the historical cost is what they paid for it. It's on the balance sheet, it doesn't change. But the accumulated depreciation keeps increasing so the carrying value, that is the net value, that is the adjusted historical cost, begins to go down. So it goes from \$86 to \$82 to \$78 as the accumulated depreciation goes from \$4 to \$8 to \$12.

### **Revised expectations**

As we indicated earlier, all these expectations can be revised, so what happens when they do get revised? And this does happen frequently especially when there are big economic downturns. Now, suppose Berger did not revise its expectations about the building during the first 3 years, so no expectation revisions at all. They were expecting the residual value to be \$30, they were expecting a 15-year useful life and they were expecting the benefits to be \$15M per year. So what's going to happen?

Near the end of year 4, just before the end of year 4, Berger revised its expectations about the building's future benefits. Berger still expected a 15-year useful life but its residual value expectation went from \$30 to \$15. So, it now expected \$15 of residual value. Remember, it originally expected \$30 of residual value. And what we didn't say in the assumptions, it originally expected to get \$15 worth of benefits each year. But now all of a sudden starting in year 5, it expects to get half of that, \$7.5 in benefits.

So we're at the end of year 4 and we're looking forward and we say, whoops, things don't look as good out there as we thought they were going to be, perhaps because there was a big downturn in the economy or just for this particular company. Well, what do we do when we run into this situation? Well, we have to revise our depreciation and our carrying values. And we have to do that before we even consider the possibility of an impairment, which we'll do shortly.

Let's look at what the revised depreciation is going to be for Berger. Here's how we'll go about calculating it. First of all, we have to know what the carrying value was at the beginning of year 4. So here's 1, 2, 3, 4. So, the beginning of year 4 the carrying value was \$78. That was how much we had on the books at that point.

We now expect the residual value to be \$15 so our depreciable amount for years 4, 5, and so on out to 15 has now changed. It's now going to be \$78 minus \$15, or \$63. That's the amount that's going to be revised going forward. How many years are left? Well, there are 12 years left because we've already gone through 3 years. So, we divide that by 12 years and that's the amount of depreciation we now expect to record each year. So, we expect to record in year 4, \$5.25.

So what's the accumulated depreciation? Well, the accumulated depreciation was \$12 at year 3 so at the end of year 4, it'll be \$17.25 now.

And what's the pre-impairment carrying value, that is, if we didn't have an impairment, what would be the carrying value? Well, it'd be \$72.75. How do we get the \$72.75? We take the historical cost and we subtract all the accumulated depreciation up until now. So \$90 minus \$17.25 and we get \$72.75.

So, you see, each of these concepts, one at a time, is fairly simple. What we've just done is revise our depreciation expectations because all of a sudden we don't think this asset is going to be worth as much as we originally thought, and therefore we have to depreciate more, \$5.25M instead of \$4M each year. So when you think an asset is going to be worth less, you have to depreciate more each year.

### **Impairment losses**

Now, we turn to the all-important concept of impairment losses. This is the excess of the carrying value, prior to testing for impairment, over the recoverable amount. Well, what's the recoverable amount?

Well, the recoverable amount is the amount you can recover by either selling the asset or by using the asset. Now, if you sell the asset, well that's the fair value and if you use the asset, well that's the value in use. So let's look at the formal definition. It's the higher of the value of the use, if you use the asset, or the fair value. So the assumption here is, you're either going to sell it or you're going to keep it, and you're probably going to do the thing that's best for you. And the thing that's best for you would generate the most value. So the recoverable amount is what you'll recover by doing the best thing you can with the asset, selling it or using it. Well, that means in order to calculate the impairment loss, we need to know the carrying value and we also need to know the value in-use and the fair value. And this is where all these concepts come together.

Let's go back to our example. Prior to testing for impairment, the carrying value of Berger's building was \$72.75. Remember, we've already taken into account the new depreciation schedule. Now, we're going to test for impairment. Assuming a \$42 value in use and a \$35 fair value, the recoverable value is just the higher of the two, which is the value in use. So we've determined that Berger can do better by keeping this property than it can by selling it. And what will we expect the value to be now? \$42.

So now you see the problem. Unless we make a change on our balance sheet, we're going to be misrepresenting to our shareholders what the value is. We're saying the carrying value is \$72.75 yet the value we expect to realize by using it is only \$42. Well, what we have to do is let the investors know what the asset is really worth and to do that, we have to write down or impair the value of the asset.

So, Berger recognized a \$30.75M impairment loss in year 4. How do you get that? Well, the carrying value was 72.75, after we adjusted and recorded the depreciation in year 4, and the recoverable amount was \$42. So they have to get the carrying value down to the recoverable amount and to do that, they have to write down the asset by \$30.75 or impair it by \$30.75.

Now we're going to do the entries for all of these in later chapters. For right now, the key is just try to get your handle on what the measurement is so you can begin to interpret numbers that you're going to be seeing frequently in financial statements.

So here we go. The carrying value at the end of year 4 is going to be \$42, the recoverable value. Now, that's at the end of the year, that's after we do the impairment. How do we get the carrying value? Well, now we go back to the original definition we started with. Carrying value is the historical cost less the accumulated depreciation, at that point \$17.25, less the accumulated impairment losses.

So, this example has helped us understand exactly what we meant when we gave the definition of adjusted historical cost. There's the \$42 carrying value. There's the accumulated impairment losses. There are the impairment losses, which are the same as the accumulated since this is the first time we've had an impairment loss and here's the carrying value pre-impairment.

Now, the last thing we're going to do with regard to adjusted historical costs, for this particular example, is we're going to look at the revised expectations after we've taken the impairment regarding depreciation. So let's look at our example again.

At the end of year 4, the carrying value is \$42. Remember, we've already taken the impairment, we've already re-adjusted the depreciation for year 4; it was \$5.25. Now, what we have to do is calculate the depreciable amount going forward. Well, remember how you get the depreciable amount? You take the carrying value, which is now \$42 and you subtract what you expect the residual value to be, which is \$15. So if we take \$42 and take away \$15, we get \$27. Now, that \$27 has to be spread over the remaining 11 years and so the depreciation will be \$2.45 per year.

Now, why has the depreciation gone down instead of up? Because we took the impairment. We recognized the decline in value of the asset as soon as we realized we're going to lose that value rather than slowly over the depreciation period.

Well, I hope this example has really helped you understand adjusted historical cost, and maybe reinforced your understanding of fair values and value in use and their importance in balance sheets.

### **Inventories example**

We also want to look at other items that are recorded as the adjusted historical cost. Remember, we said several items on the balance sheet use a related concept, and it's slightly different than for property, plant, and equipment but not much.

So let's look at the adjusted historical cost of inventories. Inventories are valued at the lower of cost or net realizable value. This can also be viewed as historical cost less accumulated impairment losses, where impairment losses are carrying value in excess of recoverable value and recoverable value is net realizable value. Another mouthful, let's look at an example.

If the historical cost of a company's inventories is \$12, that is, it costs them \$12 say if they're a retailer to buy the inventories originally, and all of a sudden the demand goes down for

these inventories. Let's say their net realizable value is suddenly \$10. So, they paid \$12 but the best they can expect to get out of them is \$10, then the carrying value is \$10. That is, they'll have to adjust the balance sheet from the \$12 of inventory to \$10 or show an impairment loss of \$2. Writing the carrying value down from \$12 to \$10 results in an impairment loss of \$2.

We also see that the inventory will now be shown at the lower of the cost and the net realizable value. Why? Well, the cost was \$12, the net realizable value was \$10. What's the minimum of those two? Well of course it's \$10. So in this case, the net realizable value is the minimum. If the asset has not been impaired, then the net realizable value will still be larger than the historical cost and in that case, the minimum will be the historical cost. And that's the usual situation.

### **Relevance to investors**

Now we want to consider the relevance of adjusted historical cost. Often, you'll hear people say, "Well look, what's really relevant is fair values and historical costs, well, they're kind of like old fashioned. They don't mean that much because they're based on historical data." Well, that's one perspective and it's a good way, sometimes, to think about it. Certainly, fair values can be very relevant as we saw earlier, but when are adjusted historical cost relevant?

Well, historical-cost-based measures are relevant to the extent they help users assess the credibility of an entity's current forecast by providing insights about how well it forecasted. If you're about to invest money in a company, the company's going to be telling you, in their annual report, "Here's what we expect to happen in the future. We're planning on big sales coming in, all sorts of future benefits and if you'll give us this money, we'll buy an asset today and it'll make you a lot of money in the future." What is the company asking you to bet on at that point? They're asking you to bet on their ability to forecast the future.

So what will a historical cost do? Well, we can look back at the past and get some insights about how good were they in the past at making forecast, how well did things turn out relative to what they forecast. Well, adjusted historical costs allow us to get insights about companies' historical ability to forecast the future so that we can use that insight to tell how reliable they are at forecasting the future. None of this is perfect, but it is a measure that helps.

So let's look at what we mean here. Let's go back to our Berger example. We're looking at the first 3 years only for the Berger example. Now, we had all sorts of uncertainty when we were making these forecasts, remember? So, let's see how things are going for the company and what an analyst might see. Now they would see the depreciation recorded during these first 3 years, so \$4, \$4, \$4 and of course the accumulated depreciation too. Now suppose that the expected benefits were \$15 each year, but in fact, the benefits turned out to be \$16. Of course, there's some uncertainty when we made the forecast: the first year so a little better than we expected; \$12 the next year; and \$6 the next year. Now think of this as one asset in a huge number of assets that the company holds.

So what they're seeing is, these benefits would show up, say, in sales or whatever and from the investors' perspective, they wouldn't see the separate benefits for each asset. They'd see all the collected benefits across the company. But let's for the moment assume that we're just

looking at this one asset. Then what would we know? Well, how much profit? And profit is a term we'll be introducing later, but it's kind of intuitive here. How much profit if we ignored all other costs that we have right here? Well, the realized benefit is \$16, but the depreciation is \$4. So the profit, net of the depreciation charge, is \$12 and it goes to \$8 the next year and \$2 the next year.

Why? Well here's what's critical. What does this tell the investor? Well, the investor, at year 3, looks back over this period and they say, "Well, look, they expected the benefits to be flat every year. They were expecting even benefits, but in fact the benefits have gone down. So perhaps we should be a little skeptical about management's ability to forecast in the future because they made this forecast." Now, this is just one data point, but if this is true for one asset, well companies have lots and lots of assets and they're making these forecasts over and over again. So they may have made a thousand forecasts for a thousand different pieces of equipment and then we'd be seeing in the realized profit across all these thousand assets how well did they do over the prior period relative to their expectations, which were flat.

Well, in that case, you see we really get a good sense of how well the company could do against expectations, and in fact, that's what we have up through year 3. We see that the company is doing progressively worse relative to expectations. Wow, then the big shocker hits. The company takes a big impairment loss. Remember the \$32.75? And what that says is we were way off.

Now that can happen on one asset just because of unforeseen circumstances. It can even happen over several assets in one period. But if you look back historically over enough periods and you begin to see the company's meeting expectations or exceeding expectations, well that would be good news.

Now, it's important to realize that this is the relevance of historical cost without any restrictions. That is if we let all management determine their depreciation rates based on their best guess of what the residual values are, what the future benefits are and whatever. But the truth is, managers aren't allowed that much discretion. Generally, in depreciation, companies tend to use straight line simply because everyone else in the industry does it or at least that pressure on them to use straight line. Sometimes they'll veer from that.

So, the point here is, if we're going to compare how relevant historical cost can be to fair value say, then we have to allow managers to have all the discretion at least in theory to find out how relevant their numbers could be if we relax the restrictions. And that's what we're trying to do here. This is the way to think about the relevance of historical cost measures. In fact, they're really relevant in situations where we allow a good deal of judgment to determine how an asset is being used over time.

## Company disclosures

Let's look at some company disclosures starting with Qantas and see how these concepts show up and in particular, in the statement of significant accounting policies. Here we are looking at Qantas Airlines and we're looking at property, plant, and equipment. This is in their significant accounting policies so what they're doing is they're saying here's how we do our accounting for property, plant, and equipment. Now, this is an airline so this means airplanes and some other smaller pieces of property, plant, and equipment, but mostly airplanes.

So items in property, plant, and equipment are stated at cost, that means historical cost. So we're using the cost method, this is called the "cost method" and that's the method we've been looking at up until now. Under IFRS, companies can also use what's called the "revaluation method" and that means they can restate their assets at fair value from time to time if they like. This is an option under IFRS. It's not an option under, for example, US GAAP.

So items in property, plant, and equipment are stated at cost or deemed cost less accumulated depreciation and impairment losses. Well, that means exactly the definition of an adjusted historical cost that we talked about in this section. Items of property, plant, and equipment are initially recorded at cost, being the fair value of the consideration provided plus the incidental cost directly attributable to the acquisition. So what did it cost us to buy the asset, what were the acquisition costs, real estate fees or whatever, and then what was the fair value of the asset. That's the original historical cost so that's how they measure cost.

What about depreciation? Depreciation and amortization are provided on a straight-line basis on all items of property, plant, and equipment except for freehold or leasehold land, which are not depreciated or amortized. Land is generally not amortized or depreciated. Why not? Because it's considered not to lose its value. The depreciation and amortization rates of owned assets are calculated so as to allocate the cost or residual value over the assets' estimated useful life to the Qantas group. Well, that's exactly what we're talking about in terms of figuring out depreciation rates.

Continuing with this Qantas footnote, let's look at software. Software is stated at cost, again the historical cost, less accumulated amortization. So software is an intangible asset and Qantas would say we're going to amortize it rather than depreciate it. So software is stated at cost less accumulated amortization and impairment losses. Again, you can impair software exactly the same way we showed in the example for impairing property, plant, and equipment.

Amortization is charged to the income statement, we'll discover that in the next chapter, on a straight-line basis over the estimated useful life of 3 to 10 years. So what they're telling us is, if we buy software and depending on what the software is, the useful life that we expect could be anywhere from 3 years to 10 years. Now again, that's a judgment, right? Because software can become obsolete very quickly with evolving technology.

Now, we're going to look at brand names and trademarks. Brand names and trademarks are carried, remember the word "carried," recognized, at cost less any accumulated impairment losses. So, it's adjusted historical cost. Brand names and trademarks are allocated to the relevant cash generating units and are not amortized as they are considered to have an indefinite useful life and are tested annually for impairment.

What are we saying here? Well, it's adjusted historical cost, but we're not going to amortize it. Why are we not going to amortize it? Well, we think our brands just don't lose value over time. That allows companies a lot of discretion, right? If they never have to write down their brands. So when a company decides that they're not going to amortize an asset over time, then they have to test for impairment every year and that's an IFRS rule.

Now, we're looking at Southwest Airlines and we're looking at a portion of the annual report called critical accounting policies and estimates. Where did this come from? Well, first of all,

it's relatively new. It was brought into existence around 2004 and it came about because of the scandals that took place around 2001 surrounding Enron, WorldCom and other companies. What happened, in the big picture sense, is that media, in particular, and many folks who are not accountants suddenly woke up and realized, "Wow, accounting has a lot of judgment in it and we don't know anything about this judgment. We need to have disclosures that tell us where it is that companies are making these judgments that have a big impact on the financial statements. And they need to tell to us about those judgments."

Now, International Financial Reporting Standards have similar requirements, but here are the requirements under US GAAP, and actually under Securities and Exchange Commission regulations. We're going to see an example.

Now, remember what they have to do if they buy an airplane for example. They have to estimate the useful life, etc. and we said that required a lot of judgment. Let's get a better insight, first of all, how they go about doing that judgment. In estimating the lives and expected residual values of its aircraft, the company primarily has relied upon actual experience, we looked at our historical data, with the same or similar aircraft types, current and projected future market information, so we'll look out there at market prices. And in doing these computations we're going to take and to involve the number of cycles that are flown. One takeoff and one landing is a cycle. So the more we take off and land the airplane, the quicker we're going to depreciate the airplane. Why? Because it turns out that the stress on an airplane is not necessarily the miles you fly it, but rather how often you take off and land. When you take off and land, it puts great stress on the airplane.

Now subsequent revisions, remember, we talked about revisions. So how do we go about thinking about when we're going to make a revision? And here's what you want to be thinking about as an analyst of the company as you look at our numbers and consider whether we will be doing revisions in the future. Subsequent revisions to these estimates, which can be significant, so be forewarned, could be caused by changes to the company's maintenance program, changes in utilization of aircraft, actual cycles during a period. So we change our flight schedules, for example start flying longer flights rather than short hops ups and downs, government regulations on aging of aircraft, and changing market prices of new and used aircrafts of similar types.

All these factors are going to go into their analysis and what they're doing in this disclosure is, they're saying, look, we're going to tell you how we make these judgments. And then you can begin to think how much uncertainty there is in these judgments by looking at all these factors. These are remarkably important disclosures to look at when analyzing a company because remember you're trying to figure out, in this case, how much confidence should I be putting into those depreciation numbers.

The next example is from British Airways and again, we're looking at the significant accounting policies. Trade and other receivables are stated at cost less allowances made for doubtful receivables, which approximates fair value given the short date nature of these assets. A provision for impairment, impairment not of the planes but impairment of the receivables, better known as the allowance for doubtful receivables, is established when there's objective evidence that the group will not be able to collect all amounts due according to the original terms of the receivables.

So, they're saying, this is what we have to do. We have to estimate our uncollectible accounts in the future. That takes judgment, lots of judgment especially amidst the credit crisis that started in 2007 and extended into 2009 and 2010. During that period, airlines or banks had to make these estimates and this took a lot of judgment. Think about curves that were really wildly dispersed during this time because there was very little credit being issued, and because there were lots of uncertainty as to whether losses would happen in the future.

Here's a disclosure on what's called available-for-sale financial assets. Assets that the company has bought and they're always available for sale, meaning we could sell these assets to generate cash. So for example, a company buys government bonds it might hold them under available-for-sale. So available-for-sale financial assets are those that are not classified as loans and receivables. After initial recognition, available-for-sale financial assets are measured at fair value. This was very controversial about 15 years ago, but now virtually worldwide, all available-for-sale financial assets are measured at fair value.

So how do we go about getting the fair value? The fair value of quoted investments is determined by reference to bid prices at the close of business on the balance sheet dates. That's precisely in the recognition video how we talked about estimating the fair value of marketable securities. Where there is no active market, that is, you know we may hold a security in another company that's not traded publicly for example, fair value is determined using valuation techniques, for example, this concept of a present value that we talked about earlier. Where fair value cannot be reliably estimated, remember you can't recognize it on the balance sheet unless you can reliably estimate it. So, if you can't reliably estimate the fair value, then maybe you can still reliably estimate the cost, which is what they're saying here.

Here's another example for British Airways. Now, we're looking at impairment of non-financial assets. The group assesses whether there are any indicators of impairment of all non-financial assets, so for example, property, plant, and equipment, at each reporting date. Goodwill is tested for impairment, remember goodwill was the asset that we looked at earlier, annually and at other times when such indicators exist. The recoverable amounts of cash generating units have been determined based on value-in-use calculations.

So, what they're saying is, when we do the impairment test remember, we have to look at what the cash generating unit is that goes with those non-financial assets. Look at that entire cash generating unit and calculate what its recoverable amount is. And therefore, we have to calculate first, what's its fair value and what's its value-in-use.

Here are two more British Airways disclosures in the same annual report; one for property, plant, and equipment. Property, plant, and equipment is held at cost. The group has a policy of not revaluing property. So even though we have this option under IFRS to revalue property, we've elected, that's our choice, not to revalue the property. Now, if you were comparing this company to another company and that did revalue their property, well, that would be apples and oranges. Because the other company would be revaluing to the fair value whereas this company, British Airways, will be looking at the historical cost adjusted numbers, which could end up at fair value if there was an impairment, but may not if there was no problem with the assets. Now, one of the things about revaluations is that you can actually write the asset up in value as well as down. So, it really wouldn't be a fair comparison.

Depreciation is calculated to write off the cost less estimated residual value on a straight-line basis over the useful life of the asset. Residual values, where applicable, are reviewed annually against prevailing market values of equivalently aged assets and depreciation rates adjusted accordingly on a perspective basis. All the stuff we saw earlier.

The carrying value is reviewed for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Again, what we're trying to illustrate here is that all those concepts that we covered earlier in the scenic route show up repeatedly in annual reports.

Inventories including aircraft expenditures are valued at the lower of cost and net realizable value. So that's a different valuation as we mentioned earlier, different measurement objective for inventories than for property, plant, and equipment.

## US GAAP

There are differences in US GAAP for some of these concepts and we're going to point those out right here. So for example, residual values, expected residual values, can be revised upward or downwards during the useful life under IFRS. So, what we saw in the Berger example, is the revision was downward from \$30 to \$15. If all of a sudden the expected residual value had gone up to say \$50 from \$30, Berger could have written up the residual value and that would have decreased their depreciation going forward. By contrast, they can only be revised downward under US GAAP. Again, that can make a difference when you're comparing assets especially assets that are possibly appreciating in value over time rather than decreasing.

Under IFRS, depreciation is no longer recorded though if the residual value is revised upwards to the point where it exceeds the carrying value. This means, in effect, that depreciation can never be negative.

Impairment losses: Impairments are defined differently under US GAAP and IFRS. Under US GAAP, impairment losses for long-lived assets are recognized through a two-step process. First, an asset is tested for impairment by determining whether its carrying value exceeds the total future cash flows the entity expects to receive from the asset or a group of related assets through use and disposal. So, there is a cash generating unit notion that plays a role here, but we look at the total cash flows and that's step one. That determines whether the asset is impaired. Then we measure the impairment, if it is impaired and only if it is impaired, similar to the way we would have measured it under IFRS.

Why is this important? Well, let's look at the Berger example. Under the Berger example, we recognized a very significant impairment of around \$30M at the end of year 4, under IFRS. That impairment would not occur under US GAAP and this is a significant difference between US GAAP and IFRS.

If we look at the carrying value of the building, remember we've already changed the depreciation to \$5.25 because we think the residual value is going down. We'd have to do that under US GAAP just as we'd have to do it under IFRS. So, the carrying value would be \$72.75.

Now, you might recall under IFRS what we did is that we then compared that carrying value to the maximum of the recoverable value, which was \$42 and the fair value, which was \$35. And that recoverable value maximum was \$42 and then we took an impairment for the difference.

But that's not what we do under US GAAP. Under US GAAP what we do is, we say what are the total benefits we expect for the following years? Well, you might recall, we were expecting benefits of \$7.5 a year and then of course we're going to get the residual value of \$15 at the end. So the total was \$97.5 that we expected to get in benefits going forward, 11 years at \$7.5 plus \$15. Well, there's no impairment. The first step of the impairment is not met. The carrying value is less than the future benefits we expected to get. In that case, we don't go to the second step, which is to measure the amount of the impairment. So, this is a really big difference. Going forward, this asset would continue to be shown in the books, under US GAAP, as \$72.75 whereas under IFRS, it would be shown at \$42 million, which is a big difference.

There's also a difference in inventories that we want to look at. Some of these differences are small but one is very large. Under US GAAP, inventories are reported at the lower of cost or market, where market is determined to be the replacement cost providing it meets two conditions. Without these conditions, it's fairly similar to IFRS. So what are the conditions? The market can't exceed the net realizable value and the market can't be less than the net realizable value reduced by an allowance for approximately normal profit. The details here are not important. One of these is called the "cap" and the other one is called the "floor." So the net realizable value has to be between these extremes.

But putting aside this particular difference, which usually is not very large, the bigger issue is how do you measure historical cost. And historical cost can be measured quite differently under US GAAP than under IFRS. The LIFO method of inventory valuation, last-in-first-out cost method, is acceptable under US GAAP, but it is not acceptable under IFRS, and many US companies use it for tax purposes and also for financial reporting purposes.

We'll study LIFO when we study inventories in a later chapter and we'll also show that when you're comparing an American company that uses LIFO [last-in-first-out] to a company outside America that's under IFRS that uses FIFO [first-in-first-out], you're going to have to be very careful about those comparisons. In fact, you're going to have to convert the US numbers that are LIFO into FIFO numbers to make the comparison. But if you don't know how to do that, you're going to be comparing apples to oranges.

### Take-Aways

So what should you know by now? Well, measurement is extremely important. When you're looking at a balance sheet, you want to understand all the various ways that things can be measured and the company is going to tell you that. All you have to do is look at the summary of significant accounting policies and you may find information about critical accounting estimates and the degree of judgment that companies put into these numbers.

All of that can help you understand how much confidence you should put into the various numbers you're looking at. So understanding what gets recognized on the balance sheet, which is the last scenic route video, is really important. But even after it's recognized, you have to understand how it was measured because all these things are measured with

different degrees of reliability. And your ability to draw inferences about this reliability will determine the level of confidence you can put in the number and then how effectively you're using the numbers.

So where do measurement decisions fit in? Well, a company first decides whether it should recognize something and then it makes the measurement decisions. And what we would have you walk away with from this video is that these are very complex decisions. Should we measure it at fair value? Should we revalue our assets? Should we report them at cost? Is there an impairment? How much uncertainty is there around all these measurements? Well, this is the uncertainty and that uncertainty goes into the balance sheet equation matrix in terms of a specific choice up here from underneath the distribution. And that choice then flows down into the balance sheet.

The concepts in this module will help you recognize common aspects of the way assets and liabilities are measured. For example, under IFRS companies are required to use adjusted historical cost for inventories and can elect to use them for property, plant, and equipment and most intangible assets. The historical cost objective is applied similarly for all these assets and that's really important.

We spent a lot of time on property, plant, and equipment and we did that because it applies across the balance sheet. They're originally recognized as historical cost and these costs, remember they're \$90M less expected residual values and impairment losses are allocated to the periods as expected future benefits are consumed.

While these concepts will guide the way we study measurements throughout Navigating Accounting, they are not enough. That is, you might think "Wow that was a long module, I got it under control now." Not at all. Measurement is inherently contextual especially with regards to the events and circumstances associated with various assets and liabilities, the related risks and the availability of suitable inputs. So as we study topics, inventories, property, plant, and equipment, pensions; all these various items that show up on balance sheets. As we study those topics, we're going to learn about the context and then we'll be able to apply the concepts that we learned in this chapter.

But you should expect in all those contexts, and even within contexts, within each of those topics, as we look at different businesses for example, that these measurements are going to be different. And that the dispersion of experts' estimates would differ and therefore the confidence you should put in the numbers will differ.

The concepts of this module will also help you understand how income statement elements are measured. As discussed in income statement chapter, income statement elements are defined in terms of changes in asset and liability measures. So, we spent a lot of time in this chapter talking about measurement, but all of that is going to get leveraged when we start looking at measurement of revenues and expenses and other elements of income statements.

Well, we hope you've enjoyed this module and look forward to the next one.