USER MANUAL
work smarter, not harder

SMART financial modelling

Build

Better

Models

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smart financial modelling

Introduction

Financial modelling is an unregulated, non-institutionalised professional activity with diverse end-user requirements. To account for the needs of all users and to sustain best practice modelling standards, Navigator Project Finance (Navigator) has developed its own best practice financial modelling methodology – SMART.

The SMART financial modelling methodology has been developed from the extensive experience of Navigator's founding principals and their belief that a professional model is characterised by transparency, flexibility and presentation. The SMART financial modelling methodology is practical, rather than theoretical or too prescriptive, and is designed to accommodate the needs of a wide range of users – from model developers, managers, debt financiers, equity investors and model auditors to the CFO.

SMART is a set of best practice modelling guidelines that emphasises transparency, flexibility and presentation, and introduces rules that underpin how Excel should be used to achieve this. When you model the SMART way, these guidelines guarantee the development of robust and flexible financial models that achieve the design objectives as well as the objectives of all users. This practice lowers model risk and increases confidence in the model, as well as confidence in the model developers and management team.

The SMART methodology will ensure you build financial models according to best practice guidelines and develop models that are transparent, user friendly and flexible. This is what Navigator strives for and why we decided to name our methodology SMART – it is just that! This is also why we want to share it with other model developers.

The SMART methodology works – it really is smart – and it will increase your modelling productivity, save you time and money, and help you build better models.

Here is your guide to the SMART methodology – it's time to work SMARTer!

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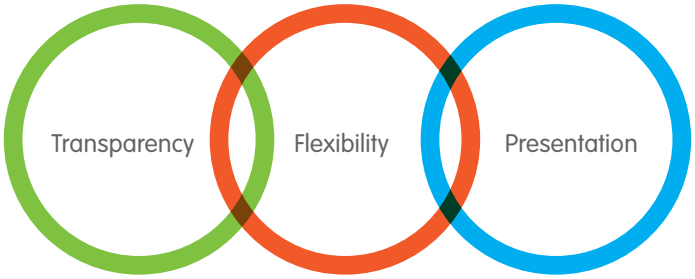
Notes from the SMART developers

The SMART methodology has been developed and refined by Navigator's founding principals and has been used to construct hundreds of professional financial models across a wide range of industries, globally. It is also the foundation of the financial modelling courses within Navigator's training portfolio. SMART recognises that there is no "one size fits all" solution to the financial modelling challenge, but if followed, the SMART guidelines, alongside a handful of rules, will result in a financial model that encourages confidence and efficiency across all situations and users.

Our financial modelling experience has illustrated the importance of focusing on ways to:

- Increase user confidence
- Lower model risk
- Efficiently use the model at all stages of its lifecycle

This can be achieved by tackling three key areas – areas which we have made the foundation of the SMART methodology:



In this user manual we walk you through the principles of transparency, flexibility and presentation and how you can apply this to your financial models to increase user confidence, lower model risk and increase your modelling productivity. We want to help you work SMARTer, not harder, and build better models.

Nick Crawley,
Managing Director Navigator

User Confidence

Financial models and spreadsheets are constructed to calculate numbers and summarise data. A SMART model increases user confidence in the model output and ensures that it is mechanically correct.

To increase user confidence, keep in mind

- User confidence results when a model is easily and quickly understood
- Multiple end users mean the model must satisfy the lowest common denominator of Excel skills
- A well presented and consistently formatted model allows for easy navigation and updating
- Logical and concise formulas are quick to understand and audit
- Models and projects evolve which means assumption cells should be clearly identified
- Dynamic scenarios will allow the user to test a variety of model parameters

Model risk

Model risk is a very real concept when evaluating a quantitative structure and needs to be managed through the consistent application of a modelling methodology and an overall risk awareness.

To minimise model risk keep in mind

- Unless a model has undergone a stringent design and peer review process, there will be errors
- It is usually quicker to rebuild than to check or adapt a model with no best practice form
- Complex mathematical solutions might result in a correct answer but how will the user know?
- Complexity is expensive to audit whereas transparency through using many rows is free

Transparency

Transparency is one of the three key principles for stress-free modelling. A transparent financial model is clear and easy to understand and use; it enables updates and reviews to be made efficiently and cost effectively. By following the principles of transparency during formula construction, the model will evolve in a way that inspires user confidence and ensures changes can be performed efficiently and reliably as the commercial framework evolves.

The principles of transparency

- Separate inputs, calculations and outputs
- Concise, simple formula
- Minimise embedded logic
- Minimise use of named ranges
- Use control accounts
- Consistently add cells
- No circular references, minimise use of macros

Separate inputs, calculations and outputs

Inputs, calculations and outputs are the fundamental building blocks of any financial model and should be presented on separate worksheets and differentiated by both location and formatting. Retrospective application is cumbersome and inefficient, so it is important that this rule is followed from the start of the model construction process.

- Input worksheets contain the hard-coded assumption cells that a user can update
- Calculation worksheets contain the logic of the model
- Output worksheets collate the key outputs to meet the users' information requirements

Use separate worksheets for Inputs, Calculations and Outputs. Differentiate your worksheets by using different colours: Red tabs – Outputs; Blue tabs – Inputs; Grey tabs – Calculations.

Concise, simple formula

Important sense checks to apply when constructing formula:

1. Can I do this calculation in my head?
2. "The rule of thumb" i.e. is the formula longer than your thumb when held up to the screen?
3. Refer to formula precedents that are close to the new formula.

Formulas in a SMART compliant model satisfy these rules by being short and simple. More complex arguments are dismantled into several shorter sequences, each on their own line.

Precedents are physically located on the same screen, eliminating the need to scroll. When F2 is pressed, the user will see the precedents driving the result of the new formula.

Example:

=SUM (OFFSET (J1, , , 1, MIN (COLUMN () – COLUMN ($I), 12))

This formula is easier to understand and check if it is broken down into two components:

Row 1 = MIN (COLUMN () – COLUMN ($I), 12)

Row 2 = SUM (OFFSET (J1, , , 1, the result of row 1)

Transparency

Minimise embedded logic

Errors are commonly found when logical functions such as IF, AND and OR are embedded within each other. Often these can be usefully combined, such as:

IF (AND (A=True, B=False) , 1, 0)

However, for anything more complex it is best practice to break the logic down into one or more lines. This risk is especially evident when embedding multiple IF statements, so don't – if you can't visualise or solve it in your head, don't build a formula to do it. This might sound extreme but the principle of simplicity really works.

Example:

```
=IF(Q267=0,0,IF(AND(Inputs!$F$263>Q391,Q391>0,Q521>0),ROUND(MIN(Q245+Q247+Q248,Q521),1),IF(AND(Inputs!$F$264>Q429,Q429>0,Q521>0),ROUND(MIN(Q245+Q247+Q248,Q521),1),IF(AND(Inputs!$F$265>Q445,Q445>0,Q521>0),ROUND(MIN(Q245+Q247+Q248,Q521),1),0))))
```

Before: *The above formula has many parts and embedded IF statements..*

65	**Cash Sweep**							
66	Covenant Breaches							
67	DSCR (12 Mths Look back)	[1,0]	1.50x	2 Mth(s)				
68	LLCR	[1,0]	1.50x	0 Mth(s)				
69	PLCR	[1,0]	1.80x	0 Mth(s)				
70	Master	[1,0]		2 Mth(s)				

After: *A formula that is broken down and displayed on several rows is easy to understand and transparent.*

*J67 = IF(AND(J119>0,$E67>J119),1,0)*J16*
*J68 = IF(AND(J144>0,$E68>J144),1,0)*J16*
*J69 = IF(AND(J155>0,$E69>J155),1,0)*J16*
J70 = MAX(J67:J69)

Minimise the use of named ranges

Applying a name to a single cell or a range can improve readability of a formula; this is especially useful when applied to constants such as conversion factors. However, it is easy to overuse named ranges, which can make interrogating formula cumbersome.

Examples of instances to apply named ranges:

- Numbers used for conversions

These include multiples of 10 and converting technical units.

= J12 * J23 / 1000000 = J12 * J23 / Million

Gold in Concentrate					
Concentrate Grade	g/t	7	7.94	9.30	8.31
Gold in Ore	koz	84	=-O32*O22/Grams_Ounce		

Using named ranges for conversions such as weight conversions reduces the risk of incorrectly applying the constant and validates the formula.

- Calendar periods – replace with short, descriptive named ranges

  = J24/365 = J24/Days_in_yr

  = J55/4 = J55/Qtrs_in_yr

Interest					
Base Rate	% p.a.	3.50%	3.50%	3.50%	3.50%
Margin	% p.a.	4.00%	4.00%	4.00%	4.00%
All in rate	% p.a.	7.50%	7.50%	7.50%	7.50%
All in rate	% p.p.	=(1+J917)^(J$13/Days_Year)-1			1.82%

Use a named range for the 'days in year' constant to make the formula above converting an annual rate into a per period rate transparent.

- Names that are likely to be often updated and prone to spelling errors:
  - month names
  - project or asset names

Use control accounts

To facilitate the construction of financial statements and analysis, it is best practice to use control accounts to illustrate the balance at the beginning of a period, movements within it, and the closing balance at the end of the period. This method also forces the model developer to consider what is being added and subtracted during the period and is particularly useful for:

- debt facilities and repayments
- stock/inventory balances
- tax creditor and losses
- working capital.

Interest Calculation				
Cash available for interest	**18.7**	**6.3**	**3.2**	**3.9**
Interest Payable	**80.3**	**79.0**	**79.0**	**79.7**
Interest expense - Calculation	80.3	79.0	79.0	79.7
Capitalised Interest	-	-	-	-
Interest Paid	-	15.0	11.5	10.4

Before: *Without control accounts and proper formatting it is difficult to identify the outstanding balance of interest.*

Interest Calculation (EUR '000)				
Balance B/f	-	80.3	144.3	211.7
Interest Payable	80.3	79.0	79.0	79.7
Interest Paid	-	(15.0)	(11.5)	(10.4)
Balance C/f	80.3	144.3	211.7	281.1

After: *When using control accounts and proper formatting, the interest expense from an accounting, cashflow and balance sheet perspective is easily identified. Tracing precedents illustrates the flow of calculations between each period.*

Transparency

Consistently add cells

Consistently add cells and line totals by displaying negative quantities or movements as negative values added to positive line items, rather than mixing the use of addition and subtraction in a single formula.

For graphing purposes a separate data area may need to be set up which reverses any negative quantities for consistent plotting.

Cashflow After Funding	131,969	141,374	158,985
Tax	2,362	11,766	29,378
Interest Income	-	-	-
Debt Service			
Interest	21,789	26,064	7,815
Principal	86,217	92,942	100,191
Total	108,006	119,006	108,006
Cashflow Available for Equity	=BR40-BR42+BR43-BR47-BR48		

Before: *Mixing additions and subtractions increases the model risk and makes it harder for users to follow model calculations.*

Cashflow After Funding	131,969	141,374	158,985
Tax	(2,362)	(11,766)	(29,378)
Interest Income	-	-	-
CFADS	129,607	129,607	129,607
Debt Service			
Interest	(21,789)	(15,064)	(7,815)
Principal	(86,217)	(92,942)	(100,191)
Total	(108,006)	(108,006)	(108,006)
Cashflow Available for Equity	=BS44+BS49		21,601

After: *Consistently adding cells and displaying negative numbers in brackets makes it easier to check model calculations which in turn decreases model risk.*

No circular references, minimise use of macros

Circular references are generally caused by incorrect coding rather than the requirement for true circular logic. It is important to differentiate between a circular reference, which is a computational alert within Excel, and circular logic. For example, circular logic occurs when:

A = B + C

C = A / B

Circular logic, although not desirable, is acceptable when it is managed appropriately using a transparent, documented and user-controlled macro.

Transparency

When modelling a concept that results in a circular reference, it is essential that the model developer is able to step away from Excel and rationalise with pen and paper why the state has been encountered. This solves most instances of circular references.

Debt Account					
Balance B/f	EUR'000		-	935,872	935,872
Refinance @ Completion	EUR'000	935,872	935,872	-	-
Principal Repayments	EUR'000	(935,872)	-	-	(35,008)
Balance C/f	EUR'000		935,872	935,872	900,864
Interest					
All in rate	% p.a.		-	7.80%	7.80%
Interest During Operations	EUR'000	757,215	-	-	-
Principal Repayments					
Annuity	EUR'000	1,620,088	-	-	108,006
less: Interest	EUR'000	(684,217)	-	-	(72,998)
Principal Repayments	EUR'000	935,872	-	-	35,008

The above example illustrates a circular reference triggered by interest incorrectly calculated on the debt closing balance. Excel cannot calculate when it is in circular reference mode.

By isolating circular logic, a developer will be alerted if an additional circular reference is incorporated accidentally. The user will be able to readily know how many circular processes are included in the model and the status of their convergence.

There are occasions where macros cannot be avoided, such as when this is requested by the end-user or in 'forward looking' controls where absolute accuracy is required. However, it is worth bearing in mind that many lending institutions will not accept models which run macros that have an impact on any element of the financial operations within the model; the reason being that macros 'hide' their design, unlike on-page formula, and can lead to instability in a model if badly designed. Hence, always avoid non-essential macros and, where a good proxy is available as an alternative to a macro, use it.

Flexibility

The primary purpose of most financial models is to analyse the impact of changes to underlying drivers as commercial structures vary from a defined Base Case. A flexible model can accommodate different scenarios quickly and reliably as it can be updated without the need to undertake significant structural changes. Flexibility therefore needs to be incorporated from the outset in a way that doesn't permanently affect the Base Case.

The principles of flexibility

- No hard coding
- Control scenarios with a dedicated manager
- Consistent formula per row
- Build in dynamic timing
- Build in spare lines
- Use flex cells to vary whilst preserving Base Case

No hard coding

In a well-designed model, the end-user can control all sensitivities and therefore perform analysis from one or a couple of clearly defined inputs pages. If a user hard-codes in a calculation worksheet then this functionality is lost and as a result the user has opened himself/herself up to a wide range of potential future errors, especially if that itinerant piece of hard coding is not clearly defined.

The following hard-coded example is difficult to update and run a simple 10% sensitivity on:

Revenue 2011 = 25000 * 65.10

Revenue 2012 = 25500 * 64.50

In this example it is difficult, when going back to edit, to remember and understand what the initial formula was meant to represent. This makes the formula inflexible and the user will have to be very careful when changing components of the formula to ensure the order of magnitude remains correct.

An example of a formula with hard coding that will be queried by an auditor:

Cost 2011 = (2051 – 1688) * 0.88 + 34110/4

A third party looking at the formula above will find it difficult to check that it is correct, which means that each figure has to be queried and rechecked.

Escalation	Num#		1.05	1.05	1.05
Capital Expenditure					
Construction Cost (Real)					
Construction Costs	EUR'000	400,000	3,333	3,333	3,333
Excavation	EUR'000	300,000	2,500	2,500	2,500
Legal Fees	EUR'000	25,000	208	208	208
Design Costs	EUR'000	25,000	208	208	208
Drainage	EUR'000	50,000	417	417	417
Total	EUR'000		6,667	6,667	6,667
Construction Cost (Nominal)					
Construction Costs	EUR'000	Flex	3,485	3,485	3,485
Excavation	EUR'000	-	=J24*J$12*(1+$E$32)		2,614

No hard coding means the end-user can control all sensitivities and assumptions by changing a few assumptions, rather than updating each calculation cell.

Flexibility

Control scenarios with a dedicated manager

A common use of a model is to run "what-if" scenarios by changing certain assumptions using flex cells. The flex cells are controlled using a well-laid-out scenario manager. By incorporating a flex cell in the model, the inputs can be adjusted by the desired percentage without having to change the Base Case inputs.

For example, a user may wish to test what happens to the Net Present Value (NPV) when capex increases by 5%.

		Traffic Base	1	2	3	4	5	6	7
		Traffic Base	Traffic Base	CapEx Up	Traffic Growth Low	Toll Price Down	OpEx Up	Interest Rates	Inflation
		Case 1							
Sensitivities									
CapEx	Y*(1+X%)	-	0%	5%					
Traffic Growth	Y+X%	-	0%		0%				
Toll	Y*(1+X%)	-	0%			-5%			
Opex	Y*(1+X%)	-	0%				5%		
Interest Rate	Y + %	-	0%					0.25%	
Inflation	Y + %	-	0%						0.50%
Exchange Rate	Y*(1+X%)	-	0%						

A well-laid-out scenario manager increases usability and is set up with pre-defined scenarios to quickly adjust assumptions.

	DSCR			Equity (Post Tax)		Project (Ungeared Pre Tax)	
Case	Min	Min Date	Averag	NPV	IRR	NPV	IRR
Traffic Base	1.20x	31-Dec-08	1.25x	194,782	19.58%	250,136	10.82%
Traffic Base	1.20x	31-Dec-08	1.25x	194,782	19.58%	250,136	10.82%
CapEx Up	1.19x	31-Dec-19	1.24x	192,667	19.29%	252,740	10.73%
Traffic Growth Low	1.20x	31-Dec-08	1.25x	194,782	19.58%	250,136	10.82%
Toll Price Down	1.20x	31-Dec-08	1.25x	194,782	19.58%	250,136	10.82%
OpEx Up	1.20x	31-Dec-15	1.25x	183,366	19.43%	234,478	10.70%
Interest Rates	1.20x	31-Dec-08	1.25x	194,782	19.58%	250,136	10.82%

The results of each scenario can be presented in dynamic tables where different scenarios can be analysed and compared.

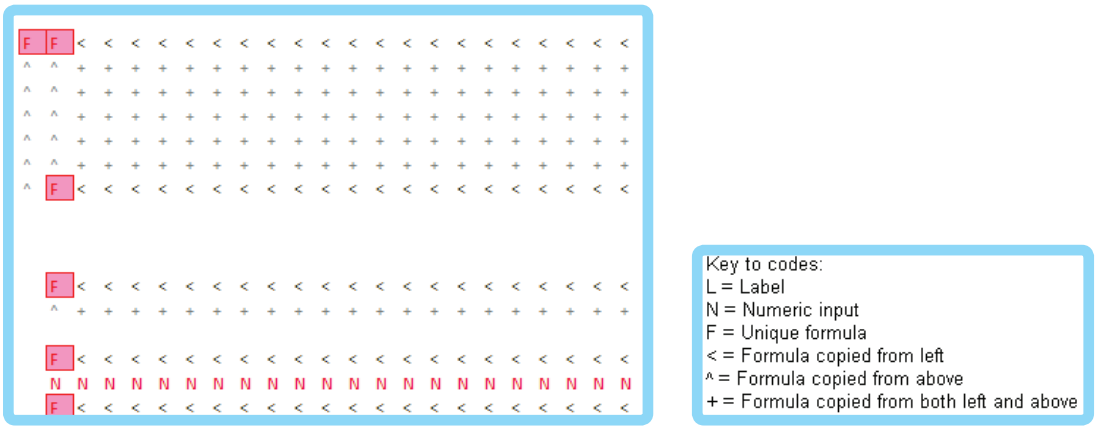
Consistent formula per row

Worksheets can generally be categorised into two types – time-dependent and time-independent. For time-dependent worksheets it is crucial that there is only one formula assigned to each row. When this rule is followed, to change or check an entire row, only one formula needs to be edited or reviewed and then copied across/down. There are no exceptions to this rule.

Nominal				
=C135	EUR / Vehicle	=J135*J$13	=K135*K$13	=L135*L$13
=C136	EUR / Vehicle	=J136*J$13	=K136*K$13	=L136*L$13
=C137	EUR / Vehicle	=J137*J$13	=K137*K$13	=L137*L$13
=C138	EUR / Vehicle	=J138*J$13	=K138*K$13	=L138*L$13
=C139	EUR / Vehicle	=J139*J$13	=K139*K$13	=L139*L$13
Total	EUR / Vehicle	=SUM(J143:J147)	=SUM(K143:K147)	=SUM(L143:L147)

Formulas are copied across and down which enables quick auditing as only the unique formulas need to be checked.

Flexibility

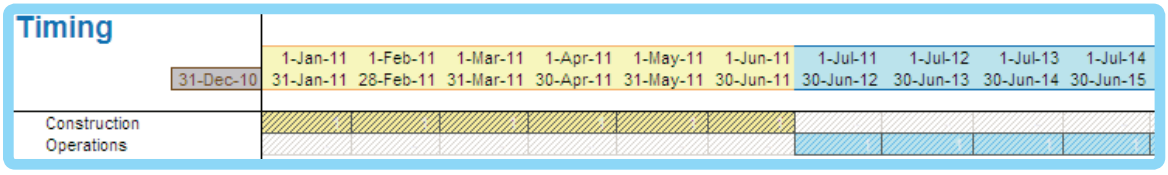


Above is the result of running maps of the formulas in a well-laid-out worksheet. Unique formulas and numeric inputs should be minimised and checked.

Build in dynamic timing

Building dynamic timing architecture is good modelling practice and enables robust flexibility. The use of Excel dating functions – such as EOMONTH – allows a simple structure to be built that, with the use of conditional formatting, provides a clear indicator of key project periods such as planning, construction and operations.

The dynamic timing structure can be complemented by binary timing flags which further identify what period of a project is underway at any given time. Binary flags allow the developer to create a formula which is consistent across a row, with relevant components, activated in the correct periods in association with the flags.



Dynamic timing illustrates each project phase using conditionally formatted binary flags.

Build in spare lines

There is always the opportunity for error when a late change needs to be made, and that adjustment has consequences for a number of items in different tabs in the model.

For example, during "soft completion stage", additional lines of capital expenditure may need to be included. Without best practice modelling this usually means the insertion of new rows on as many tabs as those new capital expenditure items need to be recognised. This could easily be in four tabs – Inputs, Construction, Integrated Financial Statements and Annual Financial Statements – if not more, making it a very risky last minute change.

The SMART methodology attempts to anticipate change and the inclusion of spare lines within Inputs for named lines circumnavigates this problem, minimises model error and increases flexibility for the user.

Flexibility

CapEx

		Total	Total	Cons M 1	Cons M 2	Cons M 3
Construction Cost	EUR'000	800,000	100.00%	0.83%	0.83%	0.83%
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			
Spare	EUR'000		-			

Include spare lines within Inputs to increase flexibility and minimise model errors by avoiding the need to add new rows.

Use flex cells to vary whilst preserving Base Case

Variations to the Base Case should be applied using clearly identified flex cells. This method allows, for example, a 10% movement in prices to be applied whilst still preserving the original price assumptions in the model.

Toll (VAT Included)

Light Vehicle (Real)	Case Selected	Base	2010	2011	2012
Base	EUR / km		0.50	0.50	0.50
Low	EUR / km		0.50	0.50	0.50
High	EUR / km	Flex	0.50	0.50	0.50
Selected: Base	Y*(1+X%)	-	0.50	0.50	0.50
Applied	EUR / km		0.50	0.50	0.50

Use clearly identified flex cells to run sensitivities to the Base Case.

Presentation

3

Succinct and consistent presentation of a model instills confidence as it signals that care has been taken during model development. The presentation and style of a model also assist users not familiar with the model to understand and operate it effectively. This in turn decreases model risk.

The principles of presentation

- Visually identify inputs
- State dimensions and labels concisely
- Develop customised style guides
- Worksheets labelled, grouped, colour-coded and ordered
- Include integrity checks
- Use conditional formatting
- Use data grouping and a clear heading hierarchy
- Make good use of the screen with freeze panes
- Use line summaries
- Summarise output using plots

Visually identify inputs

Ensure input cells are formatted consistently so they are easily identified. This practice makes the model user friendly and will prevent users from overwriting calculation cells.

CapEx

		Total	Total	Cons M 1
Construction Costs	EUR'000	400,000	100.00%	0.83%
Excavation	EUR'000	300,000	100.00%	0.83%
Legal Fees	EUR'000	25,000	100.00%	0.83%
Design Costs	EUR'000	25,000	100.00%	0.83%
Drainage	EUR'000	50,000	100.00%	0.83%
Total	EUR'000	800,000		

Clearly identified input cells allow cells to be changed with confidence and automatically updated in the calculation worksheets.

State dimensions and labels concisely

Assumptions and calculations should always have dimensions (units) stated clearly and labels entered concisely to ensure the model is auditable. This practice will help the user know which form of input number to enter and avoid converting numbers incorrectly.

For example, stating USDM instead of USD allows the user to audit the model by checking that the calculations are being converted to millions.

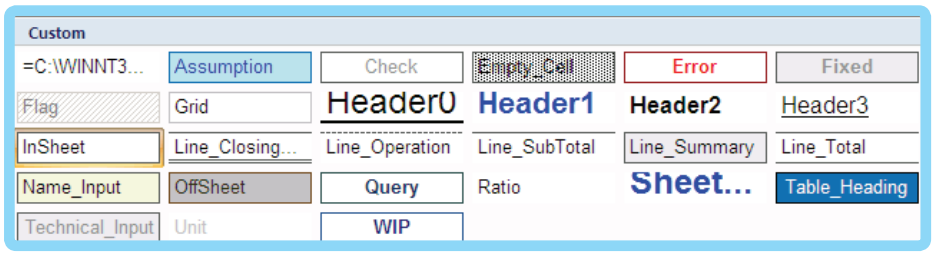
Fixed Cost		Op Yr 1	Op Yr 2	Op Yr 3
Personnel, Maintenance, Admin	EUR'000 p.a.	40,000	40,000	40,000
Fixed Cost 1	EUR'000 p.a.	50,000	50,000	50,000
Spare	EUR'000 p.a.	-	-	-
Variable Cost				
Variable Cost	EUR / Vehicle			
Spare	EUR / Vehicle			

Units entered in a dedicated column clearly show what dimensions the assumptions are to be entered in, which avoids confusion and errors.

Presentation

Develop customised style guides

To understand what a cell "does", it is important to develop a style guide of pre-arranged formatting in the "Cell Styles" manager. This style guide should be applied by the developer from the start of the model build process. By applying a consistent set of styles, a new user immediately understands the function of different cells, for example, which cells are assumption cells and which cells are key section headers. Creating styles for a workbook ahead of the model development can take time, but the benefits are many: it increases model usability and transferability, it reduces errors and makes the model a more marketable and professional document.



Create custom styles in the "Cell Styles" manager to increase model usability and transferability.

Worksheets labelled, grouped, colour-coded and ordered

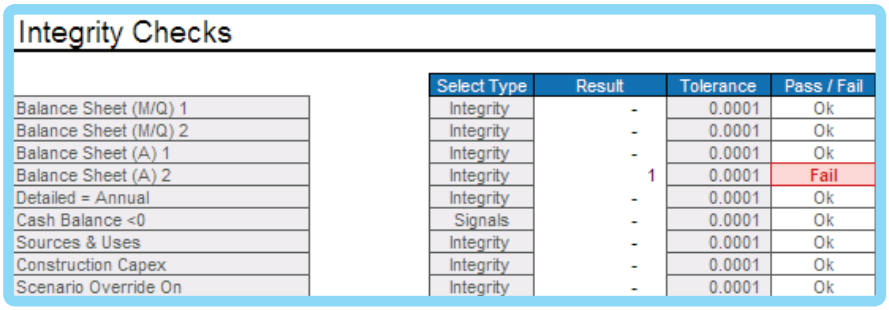
To enhance model usability and presentation impact, be careful about the formatting of worksheet labels and order them logically.

Careful formatting of worksheet labels increases usability and presentation impact.

Include integrity checks

Integrity, or functional, checks are paramount in best practice modelling as they allow the user to keep an eye on the robustness of the model architecture and formulas. For example, a classic integrity check is to check whether the balance sheet balances. To automate and make such integrity checks available for the user builds user confidence in the model and highlights concerns immediately for resolution.

SMART also promotes signal checks as best practice modelling. Signal checks are differentiated from integrity checks in that they are user defined and not designed to test the robustness of the model, but instead highlight limits breached. A classic signal check would be a negative cash balance.



Integrity Checks

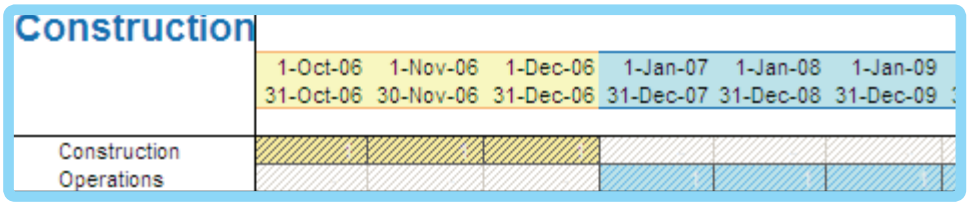
	Select Type	Result	Tolerance	Pass / Fail
Balance Sheet (M/Q) 1	Integrity	-	0.0001	Ok
Balance Sheet (M/Q) 2	Integrity	-	0.0001	Ok
Balance Sheet (A) 1	Integrity	-	0.0001	Ok
Balance Sheet (A) 2	Integrity	1	0.0001	Fail
Detailed = Annual	Integrity	-	0.0001	Ok
Cash Balance <0	Signals	-	0.0001	Ok
Sources & Uses	Integrity	-	0.0001	Ok
Construction Capex	Integrity	-	0.0001	Ok
Scenario Override On	Integrity	-	0.0001	Ok

Collate checks into one central area to immediately alert the user when there is an integrity or signal failure.

Presentation

Use conditional formatting

Conditional formatting is used to clearly communicate messages within a model and to illustrate when a particular event or phase is active or inactive. Conditional formatting can also improve the user friendliness of a model by greying out input cells or areas that are irrelevant to the chosen scenario.

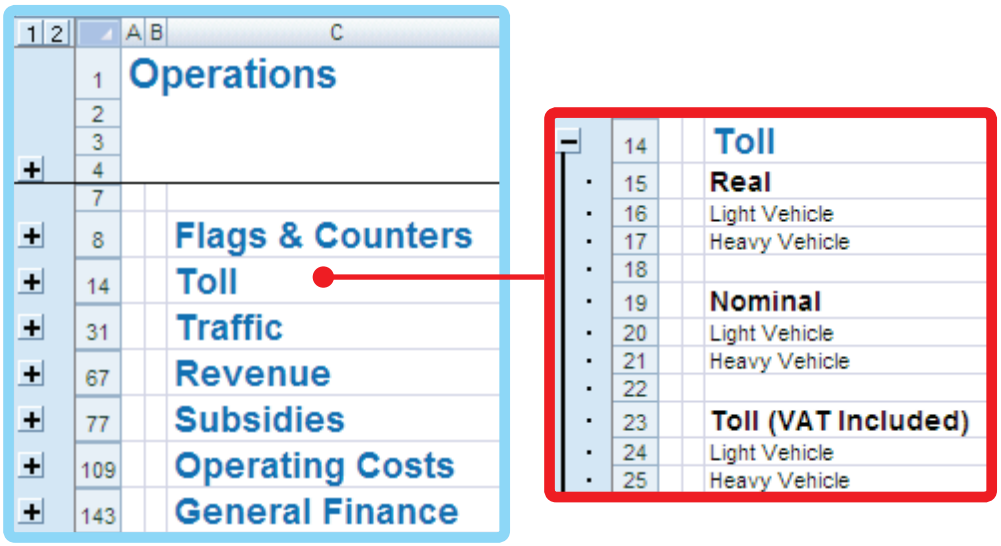


Use conditional formatting to communicate key messages and events within a model. Each phase of the project is formatted with different colours to increase visual communication.

Use data grouping and a clear heading hierarchy

Best practice model development includes the development of a well-defined hierarchy of headings which indicates key sections and subsections. When developers apply a clear hierarchy, key headers (i.e. top headers within a hierarchy) can be grouped using the Excel Grouping functionality which ensures that all tabs represent a clear and functional summary of their contents.

It is important not to be over-zealous with grouping or heading hierarchies. If avoidable, try not to develop a heading structure with more than four levels or to group within groups – this can dilute the clarity that subdividing provides by creating a structure that is too deep.



Use a well-defined hierarchy of headings to indicate key sections and subsections. When the worksheet is grouped, it reads like a table of contents to improve navigation.

Presentation

Make good use of screen with freeze panes

Freeze panes is a common but key Excel functionality and should be used to increase usability. Positioned correctly, the freeze panes tool will allow the user to always see the key titles for each row on the left hand side of the sheet and the important dating and titles elements that, in best practice, should be arranged at the top of any given tab.

	A B	C	D	E	F G H	I	BH	BI
1		**Operations**						
2		Scenario: Base Case					1-Jan-17	1-Jan-18
3		Integrity				31-Dec-10	31-Dec-17	31-Dec-18
4		User Signals						
69		**Revenue**						
70		Light Vehicle	EUR'000	Linear		5,481,701	96,622	99,248
71		Heavy Vehicle	EUR'000			4,980,285	88,570	90,977
72		Total	EUR'000			10,461,986	185,191	190,225
73								
74		**Traffic Summary**						
75		Light Vehicle	#			195,911,734	4,485,751	4,539,580
76		Heavy Vehicle	#			161,991,096	3,738,126	3,782,983
77		Total	#			357,902,830	8,223,876	8,322,563

Freeze panes allow columns to the right and rows on the bottom of the screen to be viewed with the dates and labels. Use freeze panes to increase usability.

Use line summaries

Where integrity and signal checks provide an automated cross-checking service for the developer or user, the application of line summaries for each row that can be totalled is a way of sense checking the calculations. Line summaries also offer an overview of the magnitudes of operations and financing within a project and allow the user to communicate this.

For example, a line summary for a row that calculates principal repayments on debt is useful as it will indicate abnormalities to the user and encourage further investigation. If the total is below the amount of debt drawn, this indicates that the calculating formula is not acting properly or that the debt is not being amortised before the end of a project.

Headline Cashflows (EUR'000)

	Total	2,003	2,004
Revenue	1,719,938	-	-
Subsidy	848,656	-	-
Opex	(1,184,926)	-	-
Capex	(1,021,804)	(99,237)	(282,908)
Funding: Upfront Equity	85,932	8,365	25,472
Funding: Senior Debt	935,872	90,872	257,436
Tax	-	-	-
Interest Income	-	-	-
CFADS	1,383,668	-	(0)

Headline Cashflows (EUR'000)

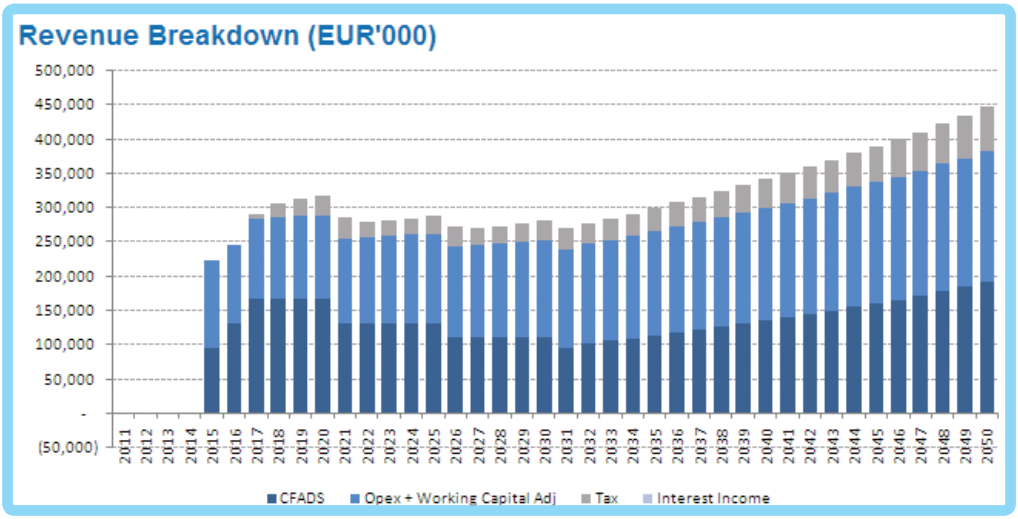
	Total	2003	2004
Revenue	1,719,938	-	-
Subsidy	848,656	-	-
Opex	(1,184,926)	-	-
Capex	(1,021,804)	(99,237)	(282,908)
Funding: Upfront Equity	85,932	8,365	25,472
Funding: Senior Debt	935,872	90,872	257,436
Tax	-	-	-
Interest Income	-	-	-
CFADS	1,383,668	-	(0)

Comparing before and after. Without any formatting, it is difficult to have a clear idea of what the key numbers in the summary are. After formatting is applied using line summaries and styles, the output is well presented and easy to interpret.

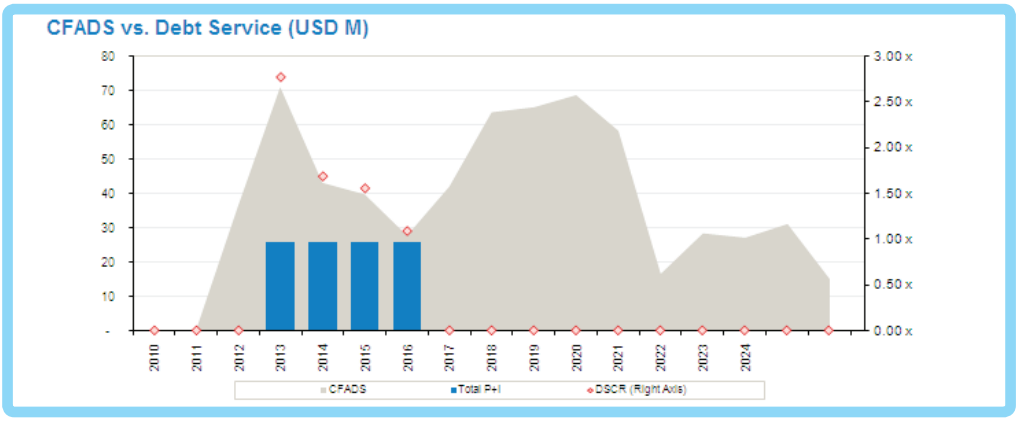
Presentation

Summarise output using plots

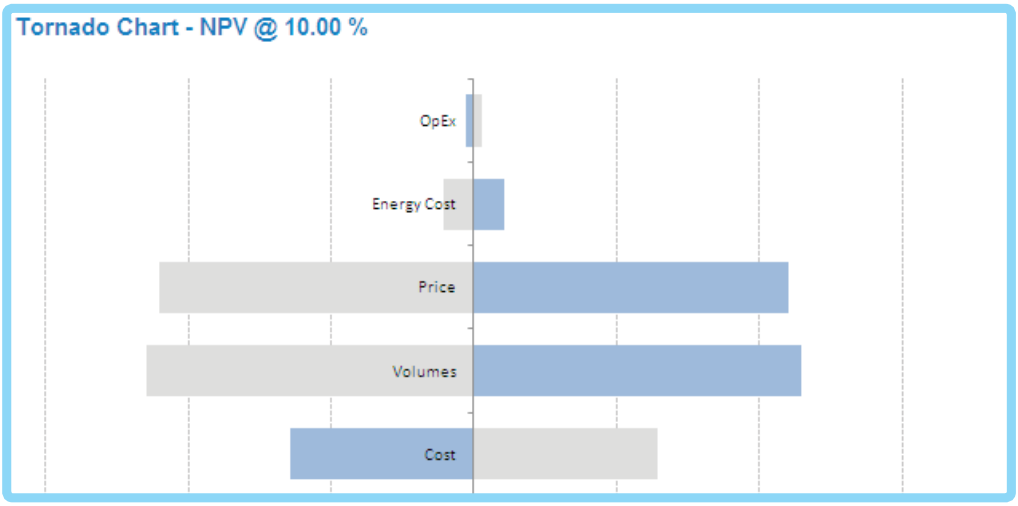
Plots (charts or graphs) should communicate the analytical objective of the model. If a model aims to communicate a message regarding, for example, returns, financing or KPIs, a plot may represent the best tool available for the purpose.



Column charts are useful to break down figures into their key components for interpretation.



Combination charts are useful for relaying a lot of information in one place for comparison and analysis.



Tornado charts are useful to identify the impact of key sensitivities on the project.

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