K4 ANALYTICS

WE MAKE YOUR ANALYTICS ACTIONABLE

Version 1.0

Introduction Manual

March 2017

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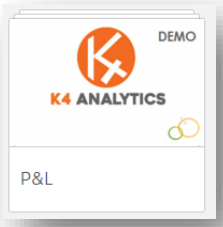
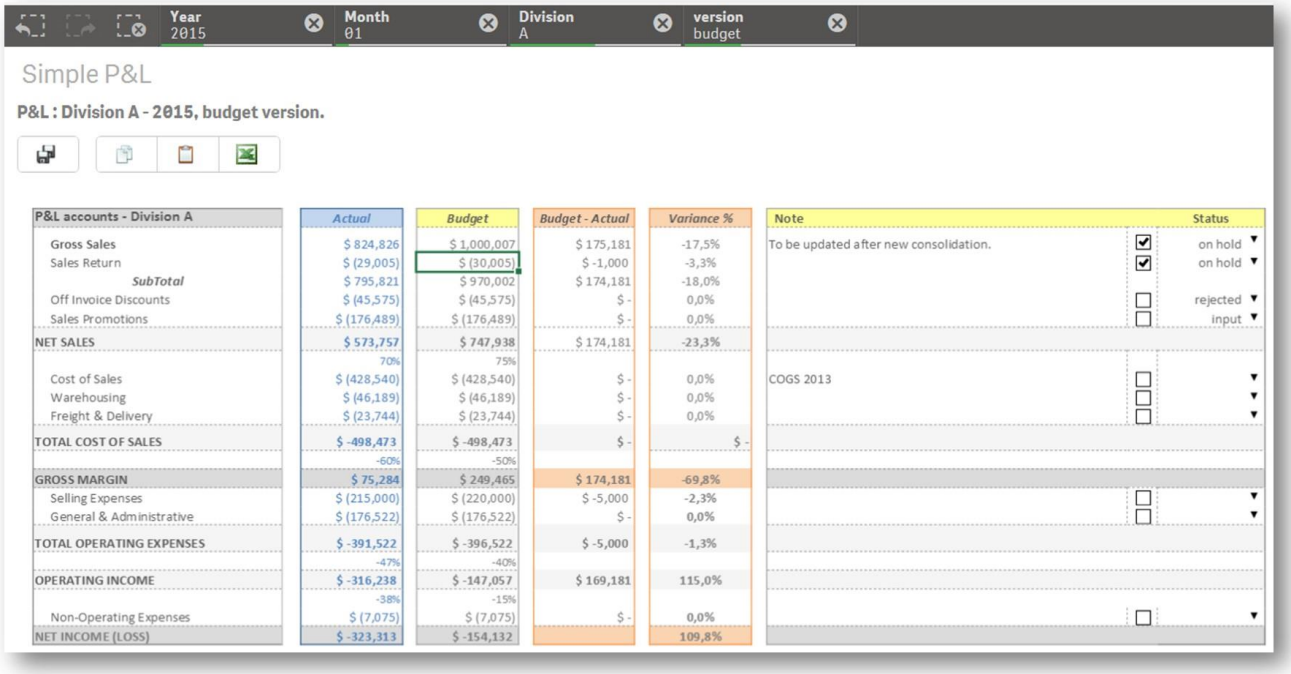
What can you do with K4?

K4 allows you to leverage all the flexibility of spreadsheets inside QlikView and Qlik Sense. Using an Excel© file as a template, keeping all the formulas and the formatting, K4 dynamically fetches data from Qlik dataset and SQL live queries to populate the Excel template.



You can, for example, use K4 to manage a simple Profit&Loss statement with amazing speed and simplicity: just build the template in Excel, link cells to data and use it inside Qlik, users are not required to have MS Excel installed.

And it doesn't stop here … you can even enter data, text, date, checkbox and drop lists in K4, saving on the fly to a SQL database!



P&L accounts - Division A	Actual	Budget	Budget - Actual	Variance %	Note	Status
Gross Sales	$ 824,826	$ 1,000,007	$ 175,181	-17,5%	To be updated after new consolidation.	on hold
Sales Return	$ (29,005)	$ (30,005)	$ -1,000	-3,3%		on hold
SubTotal	$ 795,821	$ 970,002	$ 174,181	-18,0%		
Off Invoice Discounts	$ (45,575)	$ (45,575)	$ -	0,0%		rejected
Sales Promotions	$ (176,489)	$ (176,489)	$ -	0,0%		input
NET SALES	$ 573,757	$ 747,938	$ 174,181	-23,3%		
	70%	75%				
Cost of Sales	$ (428,540)	$ (428,540)	$ -	0,0%	COGS 2013	
Warehousing	$ (46,189)	$ (46,189)	$ -	0,0%		
Freight & Delivery	$ (23,744)	$ (23,744)	$ -	0,0%		
TOTAL COST OF SALES	$ -498,473	$ -498,473	$ -	$ -		
	-60%	-50%				
GROSS MARGIN	$ 75,284	$ 249,465	$ 174,181	-69,8%		
Selling Expenses	$ (215,000)	$ (220,000)	$ -5,000	-2,3%		
General & Administrative	$ (176,522)	$ (176,522)	$ -	0,0%		
TOTAL OPERATING EXPENSES	$ -391,522	$ -396,522	$ -5,000	-1,3%		
	-47%	-40%				
OPERATING INCOME	$ -316,238	$ -147,057	$ 169,181	115,0%		
	-38%	-15%				
Non-Operating Expenses	$ (7,075)	$ (7,075)	$ -	0,0%		
NET INCOME (LOSS)	$ -323,313	$ -154,132		109,8%		

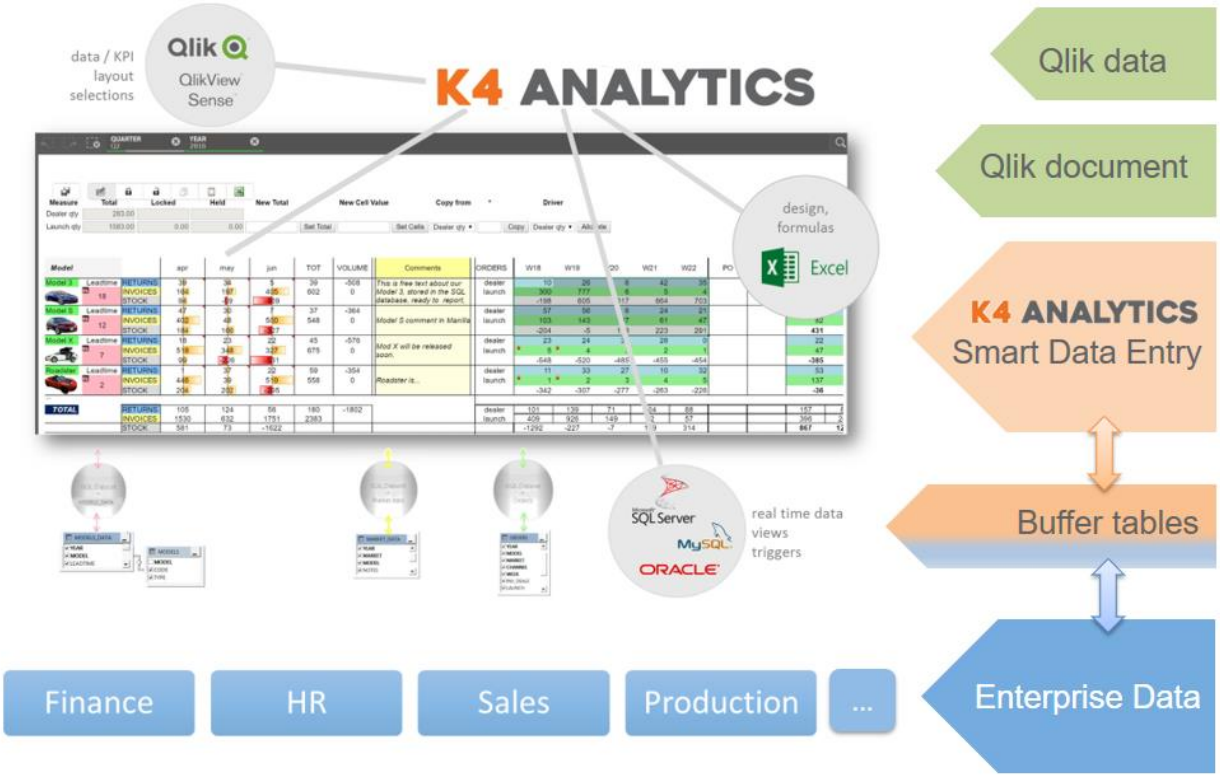
In a very simple way you can **lock data** (disable the data-entry) on a cell-by-cell basis through a Qlik or a SQL expression: you can display actual data for closed month and editable cells for planning months. The locking logic can be as complex as you need: taking into account for example the current date versus the planning calendar and the current user versus the hierarchies.

You can manage a **distributed planning process** with multiple users entering data in a common database with full control thanks to K4 ***Audit Trails*** feature.

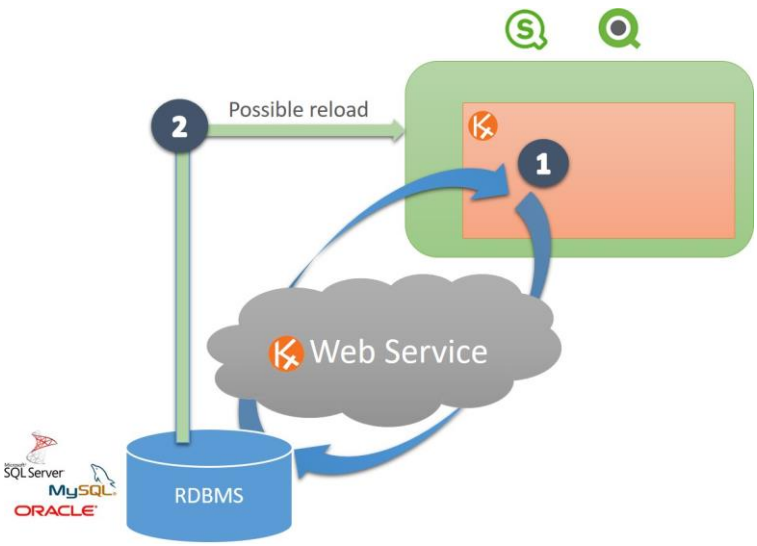
K4 **does not come with a predefined business model**, you can use it to build exactly the application you need.

How does K4 work?

The K4 solution is made of two components: the Qlik extension object and the web service. The extension object loads data dynamically from one or several Qlik datasets or one or several SQL queries and merges them into an Excel file used as a template.



If K4 is configured for data-entry, when the user hits *Save* the new/changed data is sent to the web service which takes care of writing them in a *table* in a relational database. The data is then read back on-the-fly from the SQL database when the object is refreshed. (and eventually loaded back into Qlik with a reload).



You can use the K4 object in a document opened with the browser (AJAX client) from the Qlik access point or opened with the Desktop client (in QlikView in *WebView* mode). MS Excel is not required on the clients.

K4 uses its web service for write-back. The web service receives from the K4 object the new/changed data together with the Qlik document current selection and the user id: it compares these data with the structure of the buffer table to check that it has all the information (e.g. primary keys) it needs to create/update records in the buffer table.

What are the development steps?

The best way to match the application specification is first of all to mockup the K4 layout using an Excel document. The mockup will help to identify:

- Which cells receive Qlik data
- Which Data Entry cells will need buffer tables to store the saved data
- The current selection effect in the grid: filtering and providing keys to drive cells values.

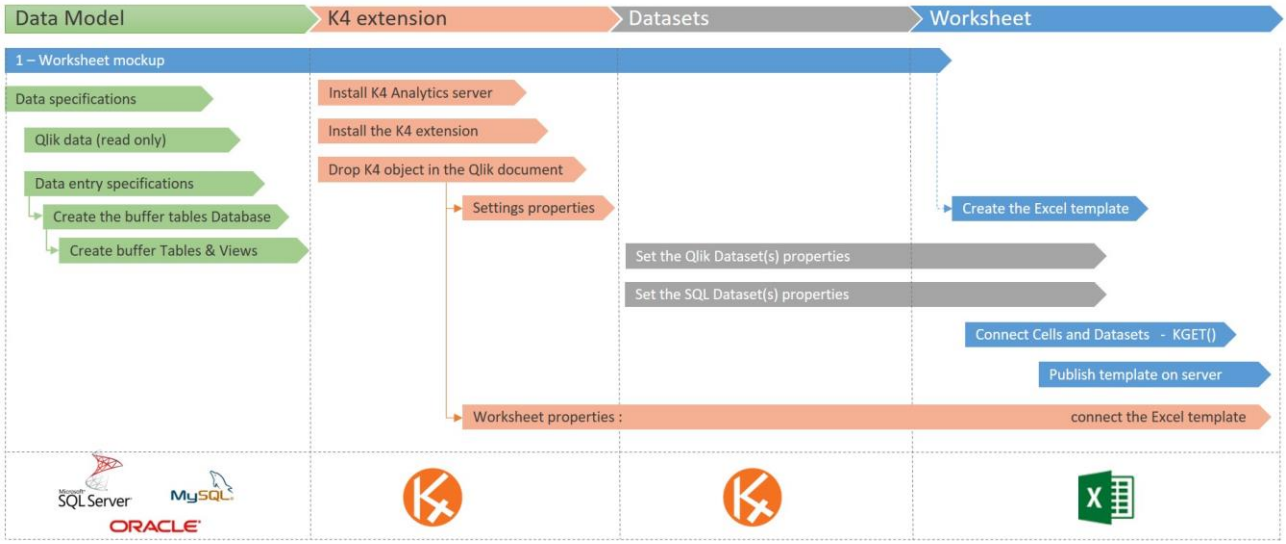
Next steps are natural:

- You can use an existing database (if MS SQL, Oracle or MySQL) to host the buffer tables, with, as a best practice, a dedicated schema. Otherwise create the database: create the security, then the buffer tables and views and maybe triggers.
- Install K4 Analytics server that will run the web services between the document and the database.
- Install the K4 Analytics extension into the Qlik Desktop, ready for object edit mode.
- Add the K4 object in the QlikView or Sense document and set the properties in 3 steps:

    1. Create the Qlik datasets (optional)
    2. Create the SQL datasets
    3. Create the template, using Excel format (and may be leveraging the mockup!)

- Publish the template on the server, using the template manager. After having also installed the K4 extension on the Qlik server, all the users can access the Qlik document with live and shared data in the K4 Analytics extension.

Workflow process overview



Preparing the buffer tables

Create or open the Database

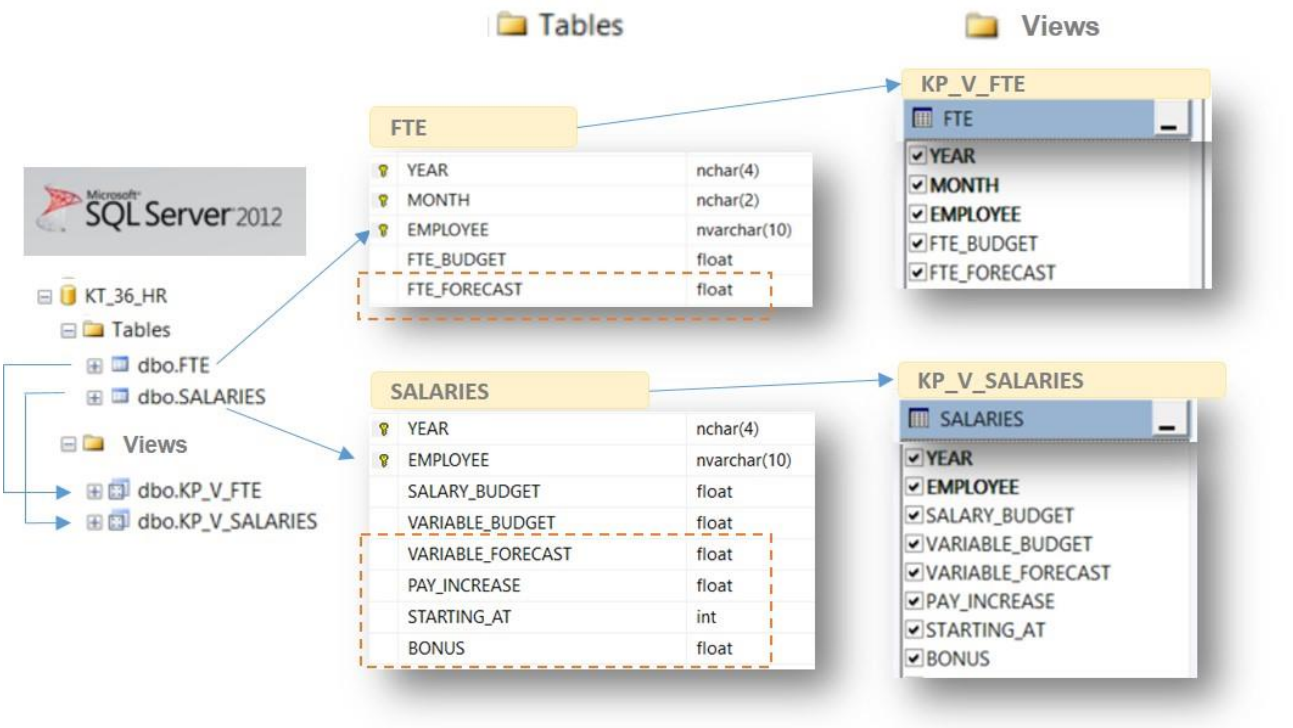
- Create a database (or restore from the K4 demos)
- Create the security (user, membership settings)
- Create the connection string to be stored at server level, in the \App_Data\connections folder.

Create the buffer table(s)

- Create the table(s)
- Create the primary keys:
  - reflecting the current selection affecting the data
  - considering the cell location in the Excel template (e.g. month column)
  - adding optional information, using the Context property.
- Create the measure fields for data entry or display only (format compatible with the template cell format)

Create the view(s), mandatory

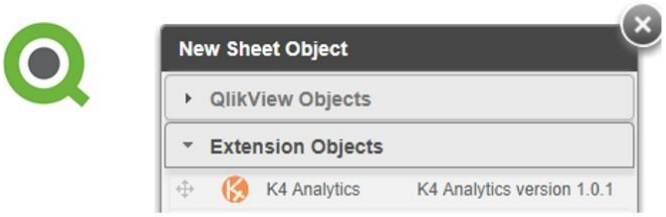
- Each buffer table requires a view, named with the 'kp_v_' prefix + table name. Why? This will open further possibilities, leveraging join when useful. The K4 extension always queries the views.

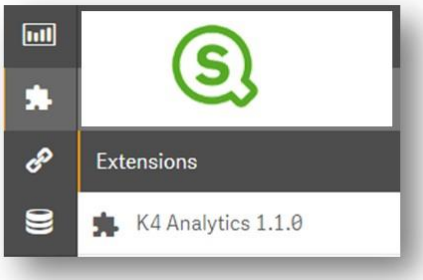


Basic settings

Add the K4 extension in the Qlik document

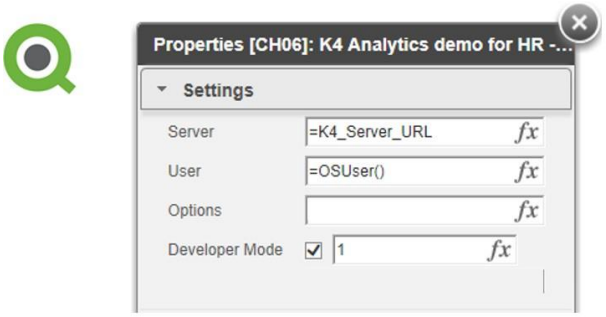
Once the K4 extension is installed in the Qlik Desktop, it will appear in the Extensions list. Simply drag & drop K4 in your Qlik application, ready to set the K4 properties like with any standard Qlik objects.

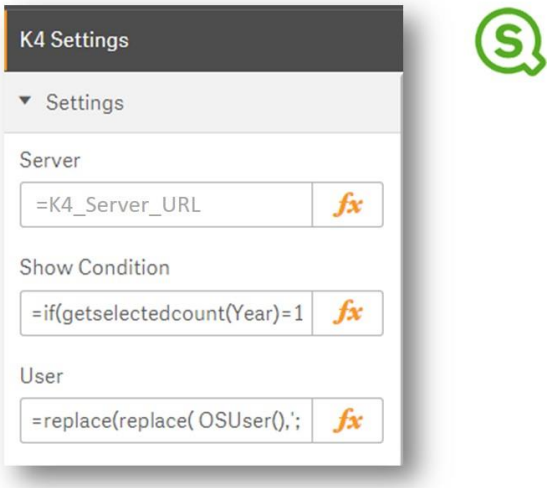




Set the basic Settings

- Open the K4 Object properties (Right Click in QlikView, Edit Mode in Sense)
- Connect to the K4 Server using the URL address

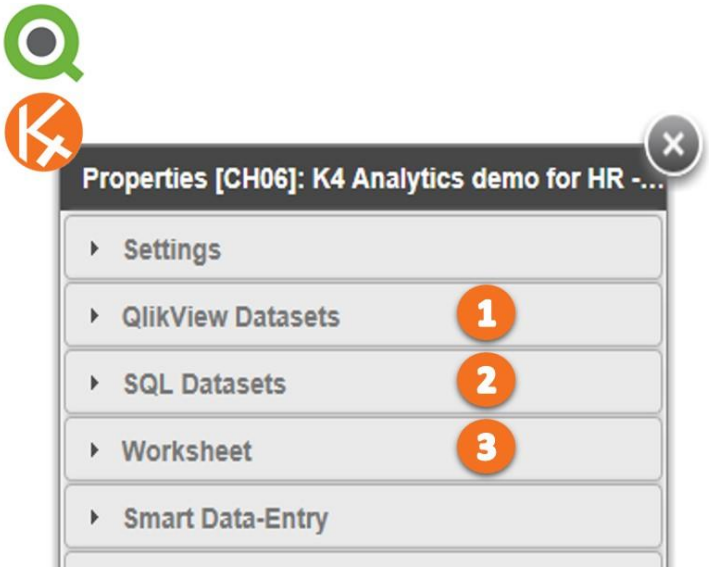


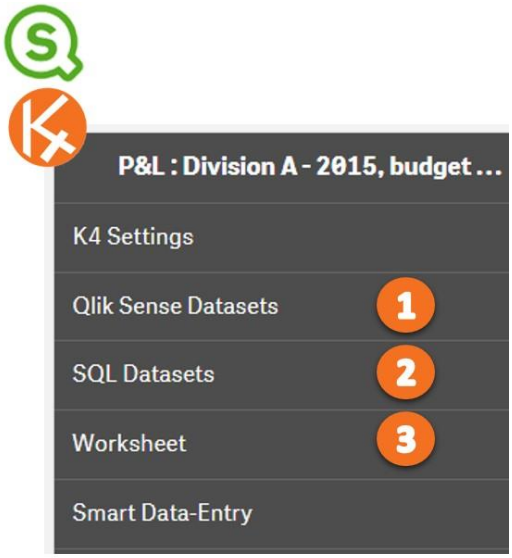


The three K4 steps overview

After the software installation and once the K4 object is connected to the K4 web services, it is time to design the user-interface and connect cells to data, ready for cells Data Entry and Smart Data Entry.

Filtered by the current selection, Qlik data and SQL data need to be loaded in virtual Datasets (steps 1 and 2). In the Excel template, the KGET() formula allows to read and write between a cell and a Dataset (step 3). When users Save in the K4 toolbar, K4 writes back from the virtual Datasets to the SQL buffer tables.





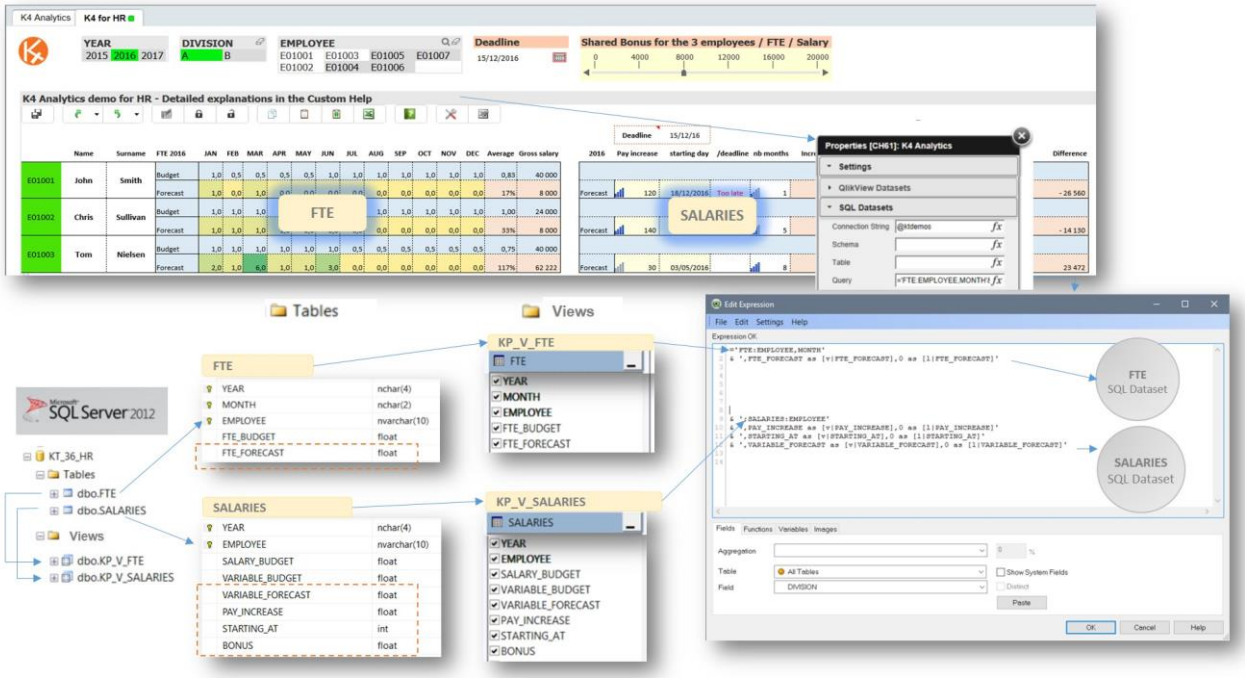
1 -Create the Qlik datasets

If the worksheet needs to display or leverage data from the Qlik document, as you would do to build a pivot table, create one or many QlikView or Qlik Sense datasets. You need to set a name (free) to identify each Qlik Dataset.

2 - Create the SQL datasets

Cells of the worksheet designed for data entry or display from data in tables (dedicated buffer tables or existing SQL tables) require one or several SQL Datasets. Each SQL Dataset name matches the buffer table name.

The schema below shows how to create the two SQL datasets used in the same HR template:

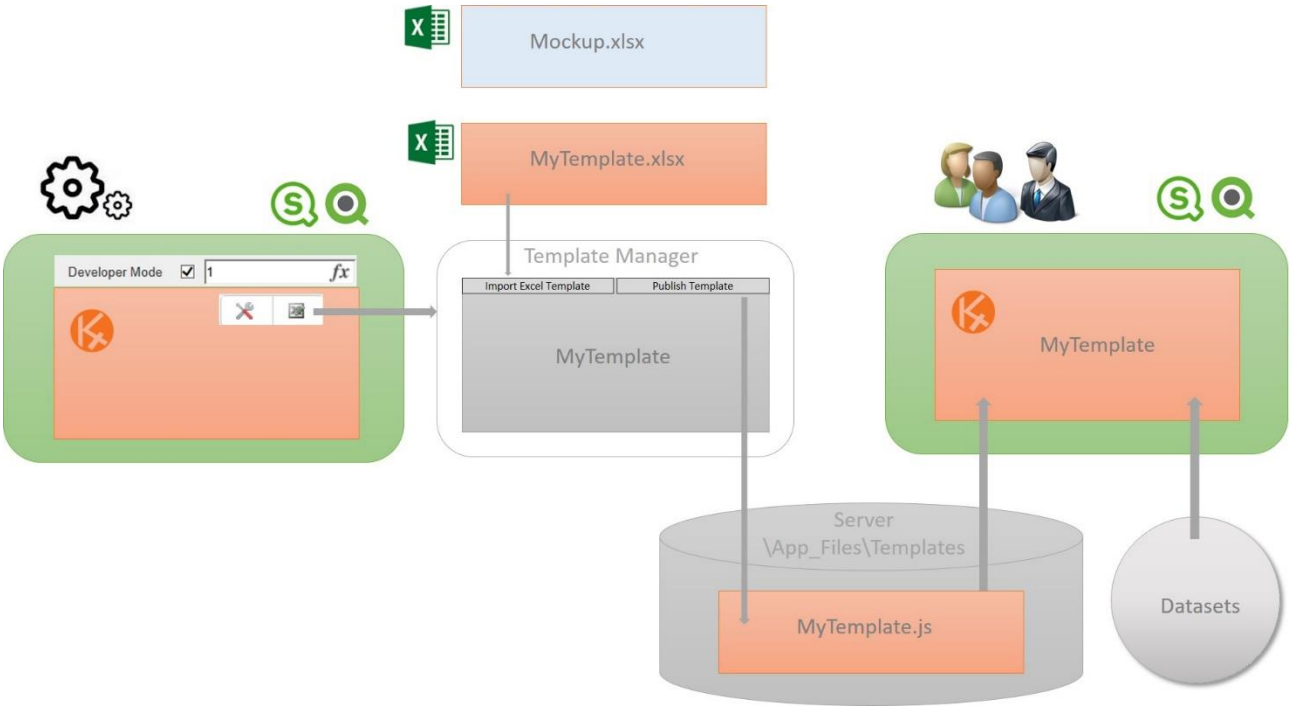


3 -Create the template

The K4 worksheet layout is based on a Excel file (MyTemplate.xlsx). This file probably gets inspiration from the initial mockup and will include additional information before making it live in the Qlik document:

- Dynamic row field identifier if the grid is not static (* to start the row block, ** to end). The P&L demo shows a static grid while the HR and Sales budgeting demos are using dynamic row fields (Employees and Products) to populate the rows.
- Link between cells and data in the Qlik and SQL Datasets: using the KGET() formula.
- Totals management leveraging the KCELLSUM() formula.
- Conditional formatting
- Validation rules
- Excel hidden rows/columns
- Dynamic Row/Columns hiding

When the Excel template is ready, the template manager will save MyTemplate.xlsx in .js format and publish it on the server (specific location in the \App_Files\Templates folder).



Modifying the template follows the same process. Then, the developer will be able to add a new column with totals or modify some color coding or change Excel calculations in the layout can be set in few minutes. When published, the modified application is immediately available to all users

Templates with static rows:

In the Excel template, each cell can directly 'grab' data from the dataset(s) using the KGET function.

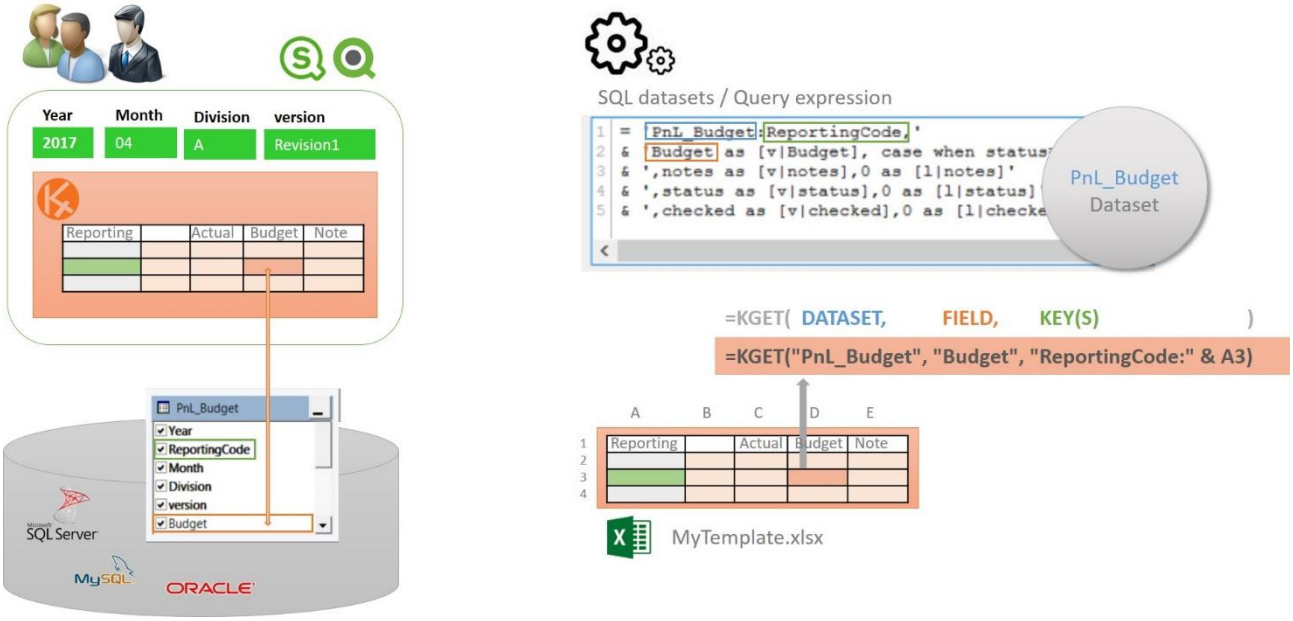
In the P&L model below, the Budget cells are designed for data entry, to be saved in the Budget field of the PnL_Budget table. Each Budget cell refers to primary keys:

- Year, Month, Division and version that are driven by the current selection
- Reporting code, identified by the cell row in the grid

The KGET() formula in the Budget cell needs to know which table, which field and which reporting code.

The K4 web service will save the Budget cell value in the table, knowing the primary keys from the KGET() information + the current selection and updating the record in the buffer table.

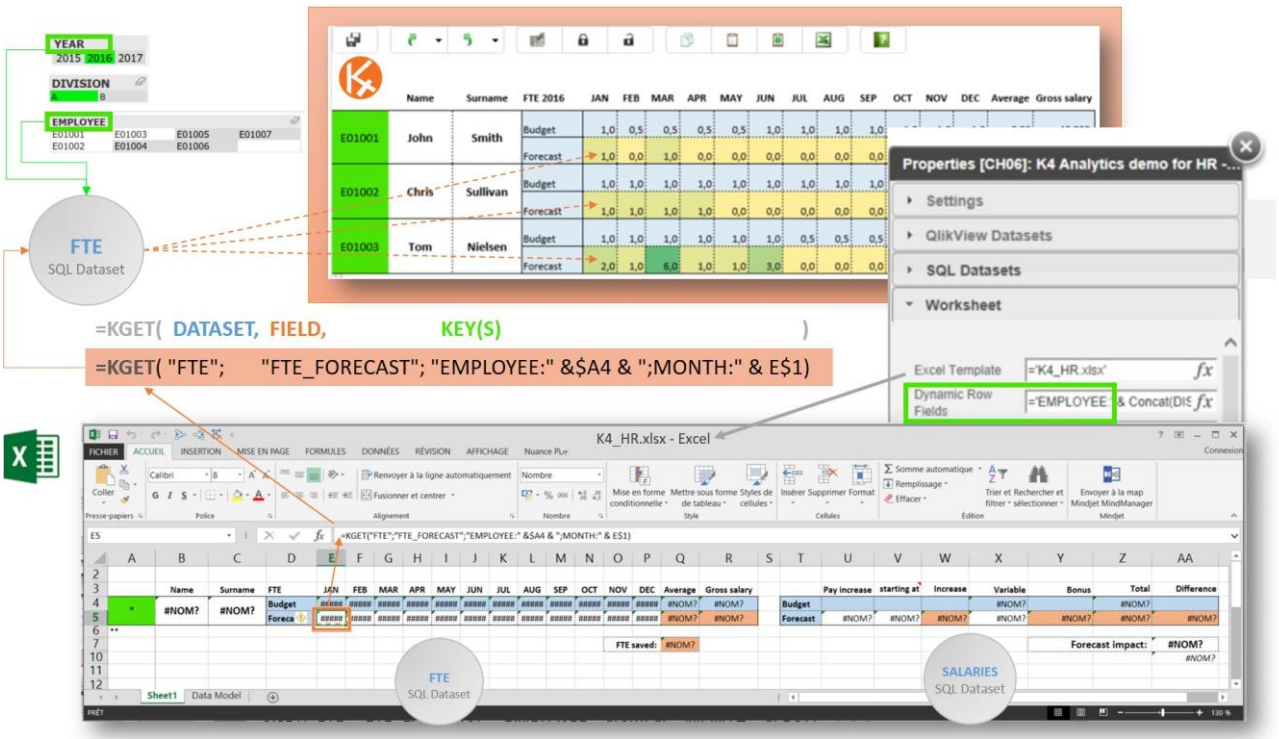
*NB: when the table record does not exist yet, K4 needs additional information to create it record in the buffer table, using the **Virtual Records** property in the SQL Datasets properties.*



Templates with dynamic rows:

As shown in the HR demo it is possible to manage dynamic grids, filtered by the current selection. In this example, selecting a Division will provide a list of employees. Each employee in the grid will get 2 rows. In the template, you just need to describe the cells for 1 employee. It can be 1 or more rows, starting at the * cell, representing the Employee key ID, and ending before the ** cell.

In the application, the Employee block (2 rows) will be replicated for every selected employees.



When the grid has to display a dynamic list of rows, filtered by the Qlik current selection, you have to specify which Qlik dimension will filter the rows in the *Dynamic Row Fields* property in the *Worksheet* properties. The KGET() formula will point the * cell as a primary key.

Each dataset has a name and a number of measures: these are referenced in the cell formula using the *KGET()* function.

This technique is extremely powerful and flexible at the same time:

- The different datasets may have different *granularities* (i.e. keys or dimensions). In the same template you could, for example, combine monthly and yearly data.
- If the user changes data in different datasets, when he/she saves, data is updated in the different tables at the same time.
- Since each cell has all the information to save back to the SQL database, you have the maximum freedom in placing cells in the template layout.
- It is also possible to save back to the SQL database the calculation of an Excel formula.

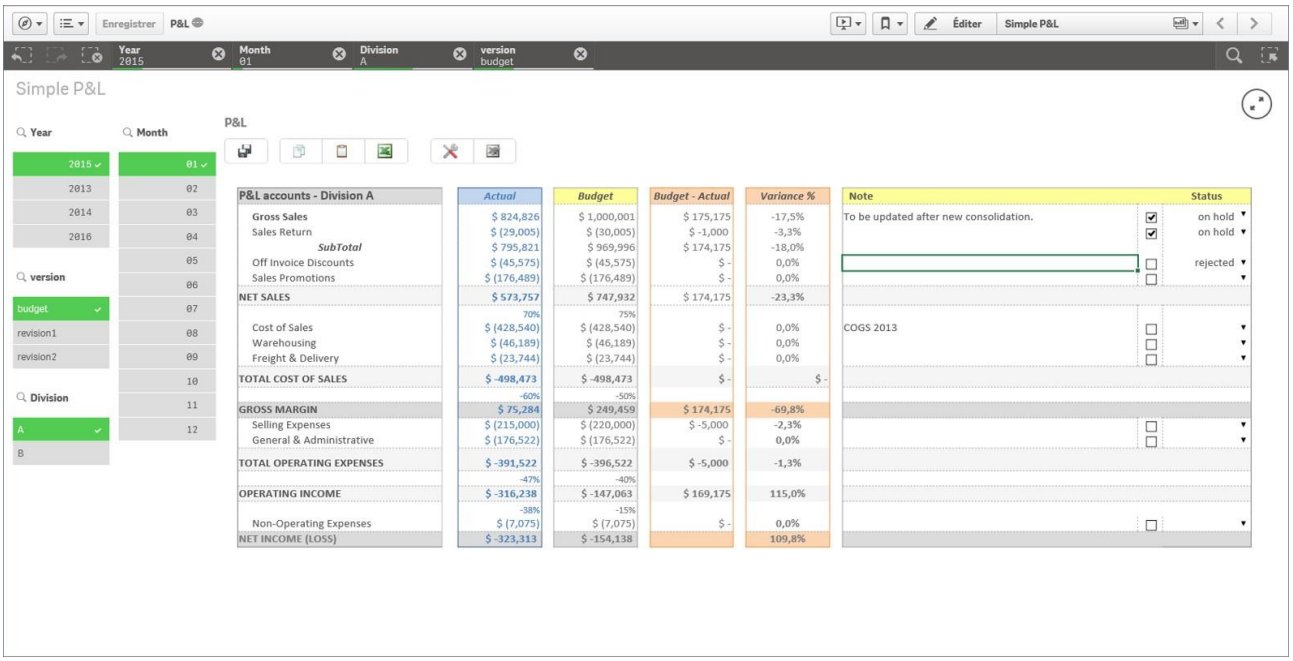
K4 Analytics: demos overview

K4 official demos are available for presentation, evaluation and training. Each of them are available in both QlikView and Sense format, sharing the same demo database and Excel templates.

They are provided to highlight diversity of the business application scopes and to showcase most of the K4 features in QlikView and Sense. These demos show a lot of best practices that hopefully will stimulate developers' imagination.

Profit & Loss (P&L)

This simple P&L displays Actuals and Budget data. The user can input new budget monthly values, notes and workflow information. The Excel formulas in the template immediately calculate and display the difference and the variance.



This demo highlights different types of data entry (the yellow columns)

- Data (Budget)
- Text (Notes)
- Checkbox
- List (workflow status)

The Actuals (blue column) are data provided by the Qlik document and the Budget-Actual and Variance columns are calculated by Excel formulas.

The grid is filtered by the current selection (Fiscal Year, Version, Division and Month).

When a Reporting row has an "Approved" status (right column), the Budget data entry is locked.

In the K4 toolbar, the Save icon writes back the inputted data. There is also a grid export to Excel.

Sales budgeting

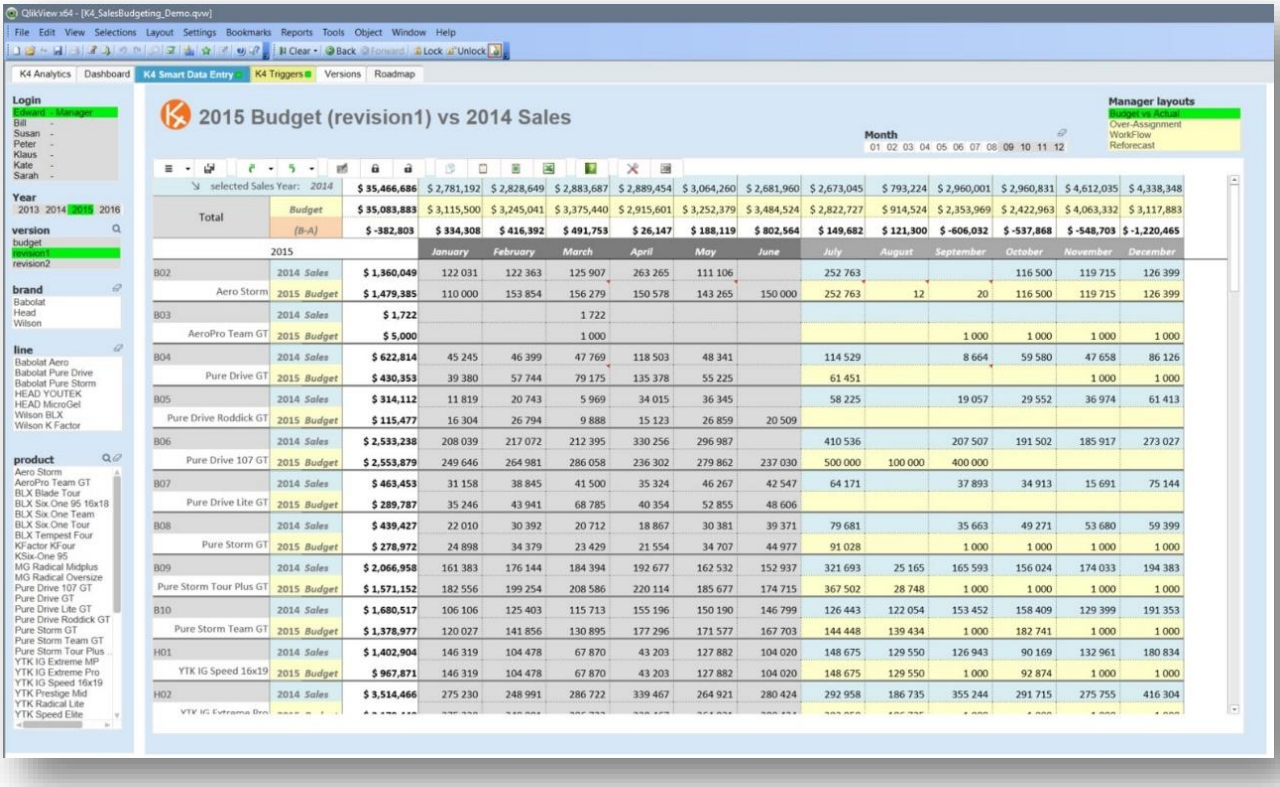
This Sales Budgeting demo is based on a security model by Users and Roles. There are 4 topics in this application, controlled by the user role:

- Budget input (data and cell notes), with a Sales base.
- Over-Assignment by the Manager
- Workflow, approval process
- Reforecast, knowing the Actuals (the Manager only can lock months to Actual).

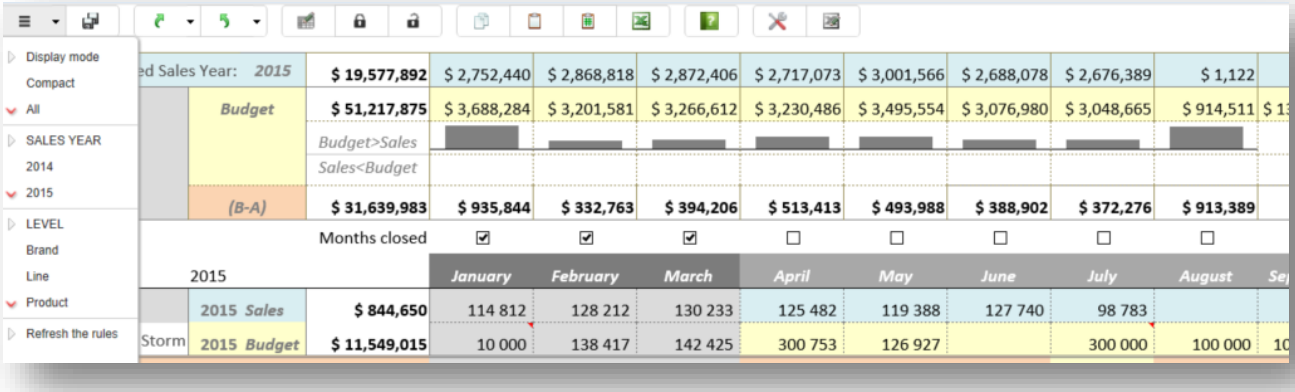
Budget input:

This sheet offers Budget Data Entry by cell and Smart Data Entry by group of cells:

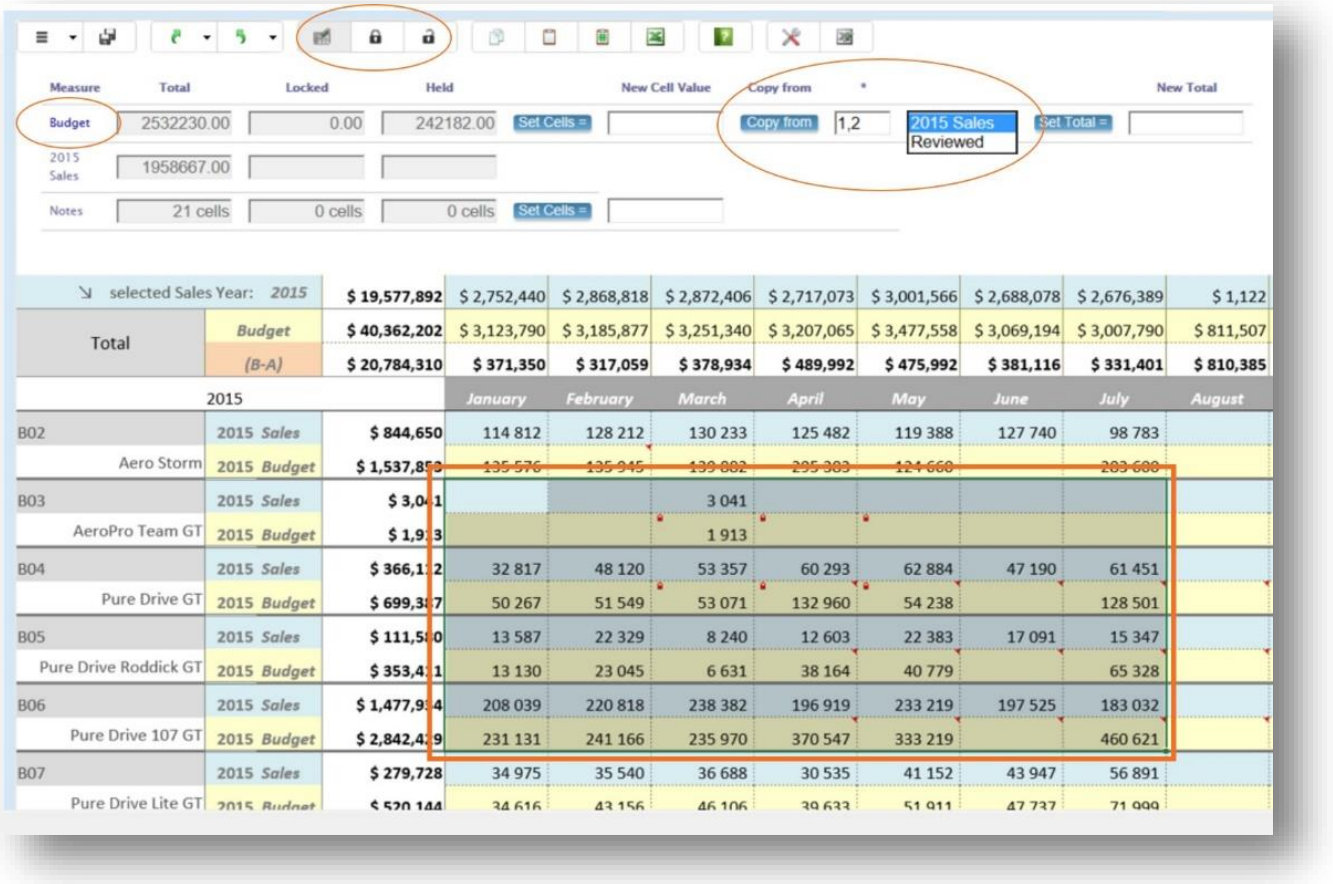
- Fiscal year budget cells to input (yellow cells)
- Selectable year Sales, read only (blue cells),
- Actual months automatically locked (grey cells – no data-entry)



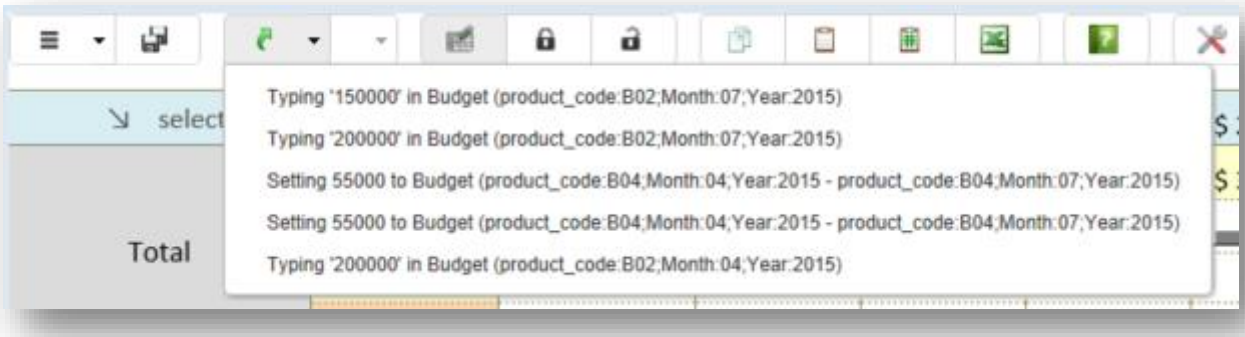
The K4 menu handles Qlik variables. The dynamic properties leverage the Qlik variables to determine the display. Here you can select the Sales year to display, show/hide specific rows/columns, etc.



Open the Smart Data Entry panel, freeze cells you do not want to modify and select different actions for the selected cells (e.g. copy Sales in the Budget cells with a growth factor, add a shared comment to different cells, set the cells total accordingly to the existing distribution or apply an allocation driver…)



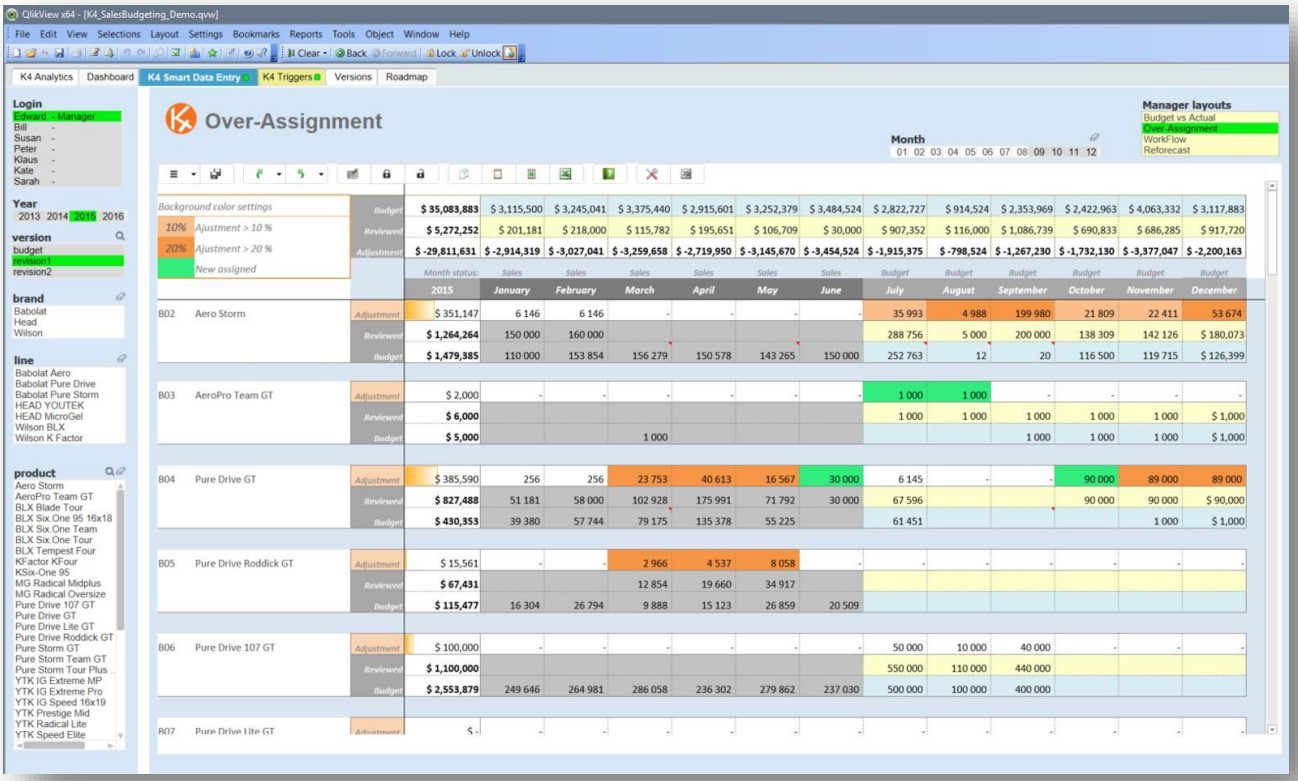
After several entries, until a final Save, you can Undo/Redo the previous actions:



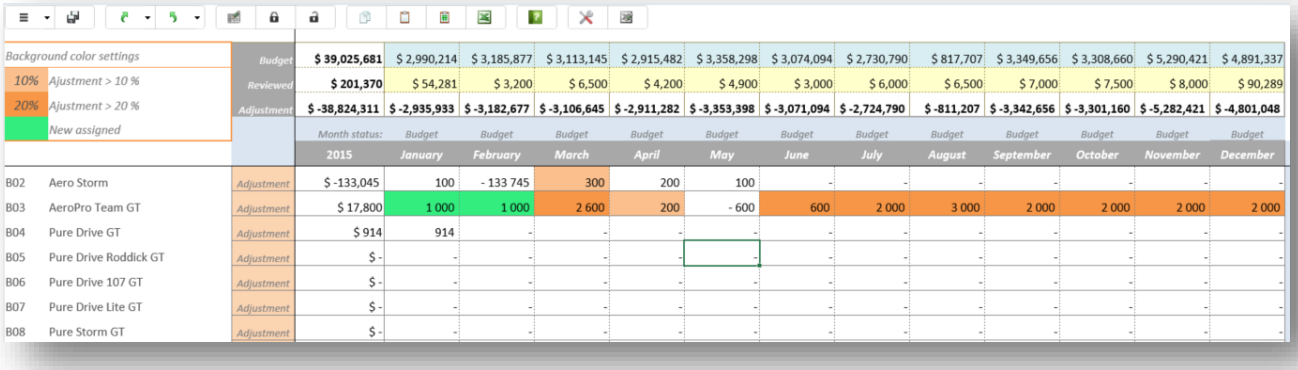
Over-Assignment:

This layout is available only for Users having the Manager role. Budget values may be over-assigned. Then the adjustment is displayed.

Adjustment cells are color-coded (thanks to Excel conditional formatting rules) accordingly to preset thresholds. The user can modify the thresholds to visually highlight the adjustment weight.



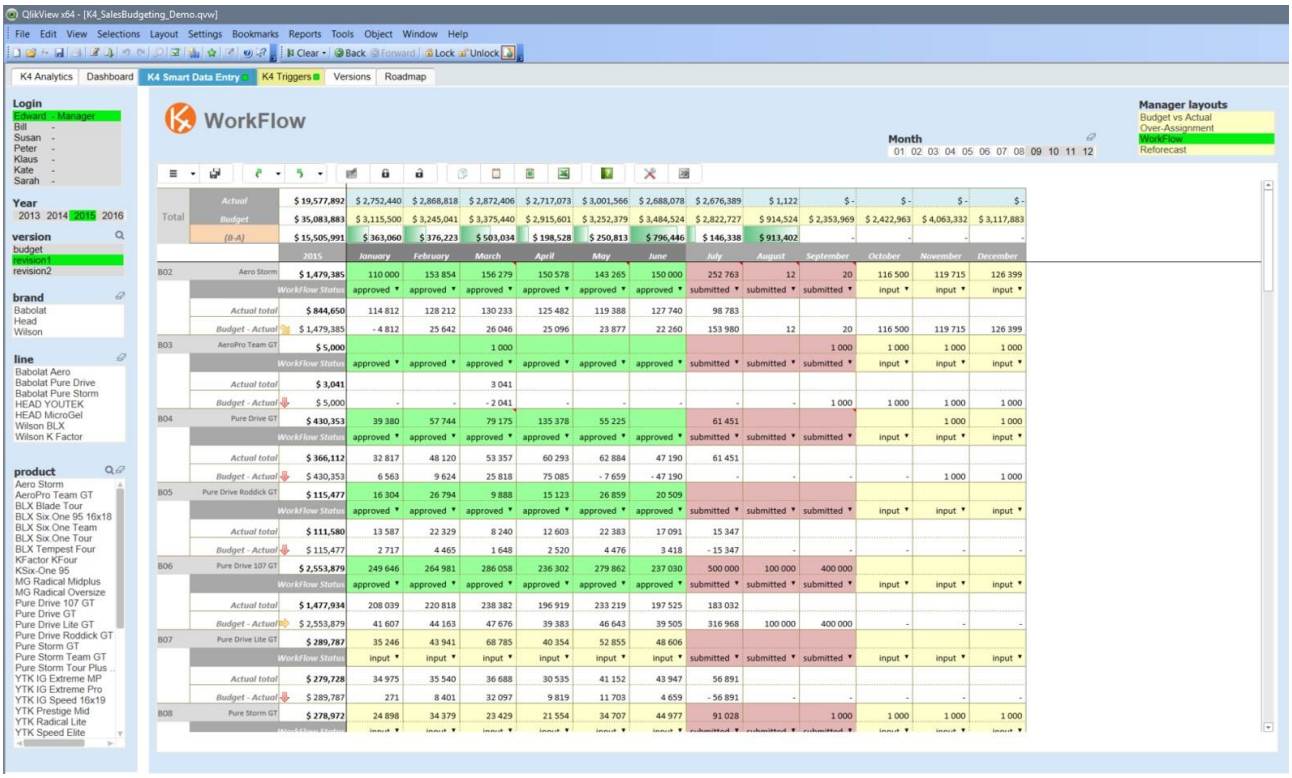
After Over-assignment inputs, a compact display will give a clear overview of the adjustments. This layout can be exported in an Excel file or shown in different QlikView or Sense documents. E.g. the manager will send to the brand manager for his brands.



Background color settings	Budget	$ 39,025,681	$ 2,990,214	$ 3,185,877	$ 3,113,145	$ 2,915,482	$ 3,358,298	$ 3,074,094	$ 2,730,790	$ 817,707	$ 3,349,656	$ 3,308,660	$ 5,290,421	$ 4,891,337
10% Ajustment > 10 %	Reviewed	$ 201,370	$ 54,281	$ 3,200	$ 6,500	$ 4,200	$ 4,900	$ 3,000	$ 6,000	$ 6,500	$ 7,000	$ 7,500	$ 8,000	$ 90,289
20% Ajustment > 20 %	Adjustment	$ -38,824,311	$ -2,935,933	$ -3,182,677	$ -3,106,645	$ -2,911,282	$ -3,353,398	$ -3,071,094	$ -2,724,790	$ -811,207	$ -3,342,656	$ -3,301,160	$ -5,282,421	$ -4,801,048
New assigned		Month status:	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget
		2015	January	February	March	April	May	June	July	August	September	October	November	December
B02 Aero Storm	Adjustment	$ -133,045	100	- 133 745	300	200	100	-	-	-	-	-	-	-
B03 AeroPro Team GT	Adjustment	$ 17,800	1 000	1 000	2 600	200	- 600	600	2 000	3 000	2 000	2 000	2 000	2 000
B04 Pure Drive GT	Adjustment	$ 914	914	-	-	-	-	-	-	-	-	-	-	-
B05 Pure Drive Roddick GT	Adjustment	$ -	-	-	-	-	-	-	-	-	-	-	-	-
B06 Pure Drive 107 GT	Adjustment	$ -	-	-	-	-	-	-	-	-	-	-	-	-
B07 Pure Drive Lite GT	Adjustment	$ -	-	-	-	-	-	-	-	-	-	-	-	-
B08 Pure Storm GT	Adjustment	$ -	-	-	-	-	-	-	-	-	-	-	-	-

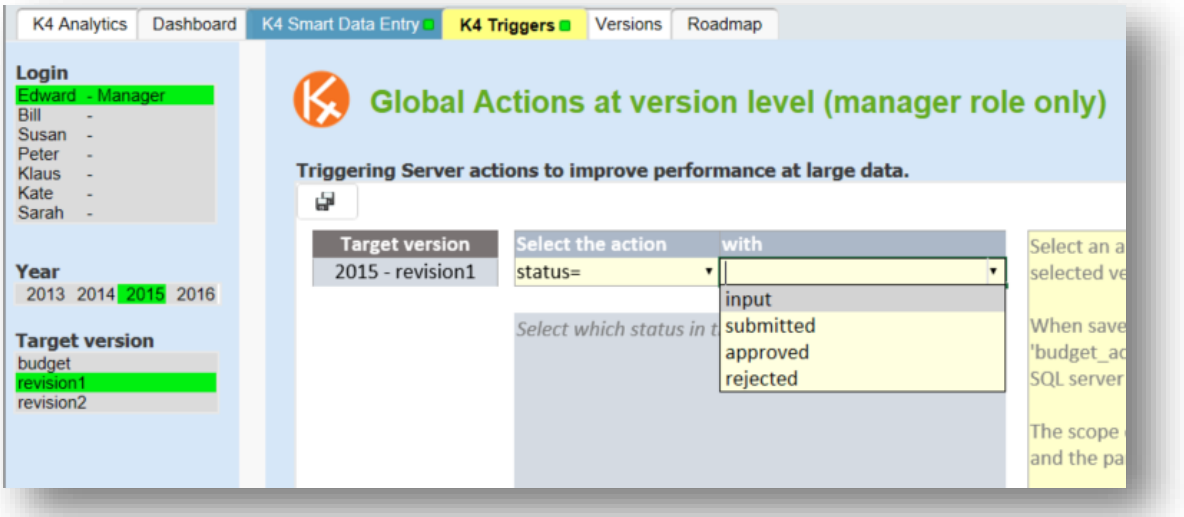
Workflow, basic approval process

This a basic example of what could be explored with K4 features. Based on a Status drop list (input, submitted, rejected, approved), each budget cell status can be edited.



Using the Smart Data Entry panel, you can change the workflow status by cell blocks (except for locked and held cells).

Using the triggered actions, you can reset all the cells to a specific status (e.g. all approved). This way breaks the grid limitations (approx. 10.000 cells in the current display) to unlimited number of cells in the budget version.

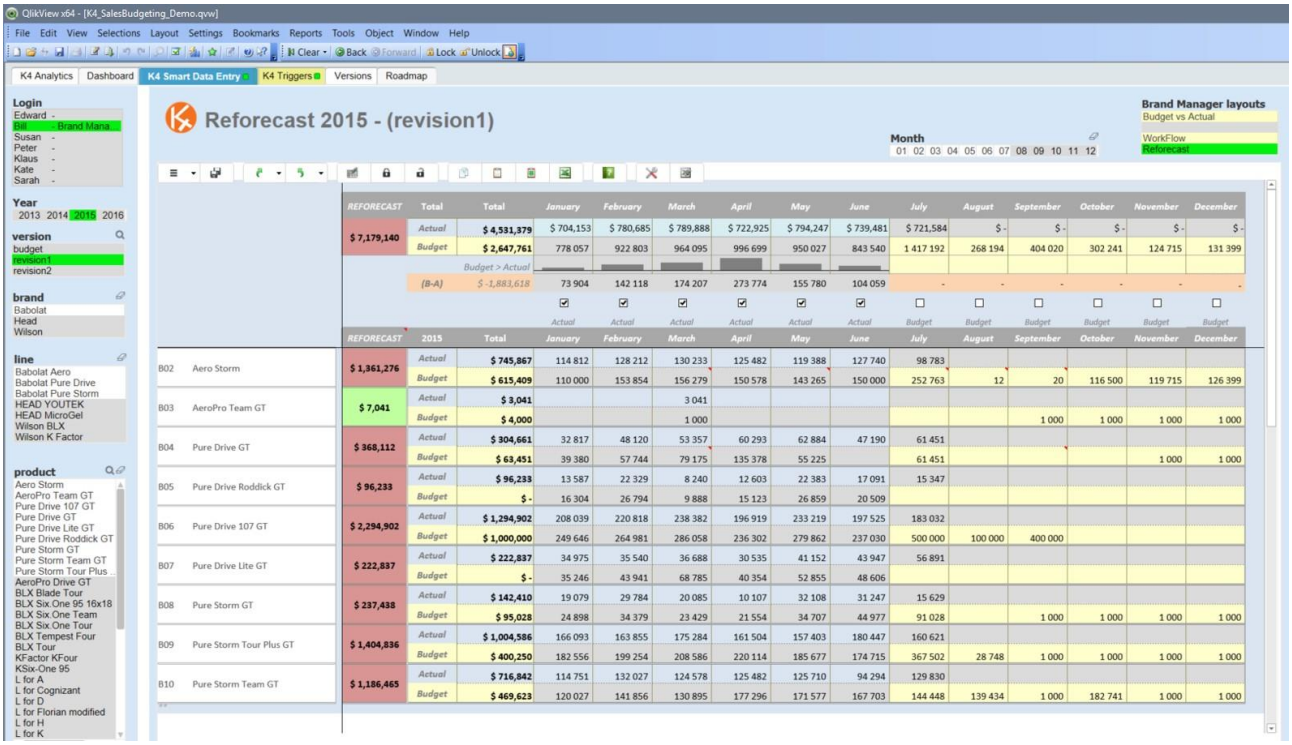


The cells status is stored in the SQL table, useful to lock data entry depending on business rules, or color-coding the cells in different reports.

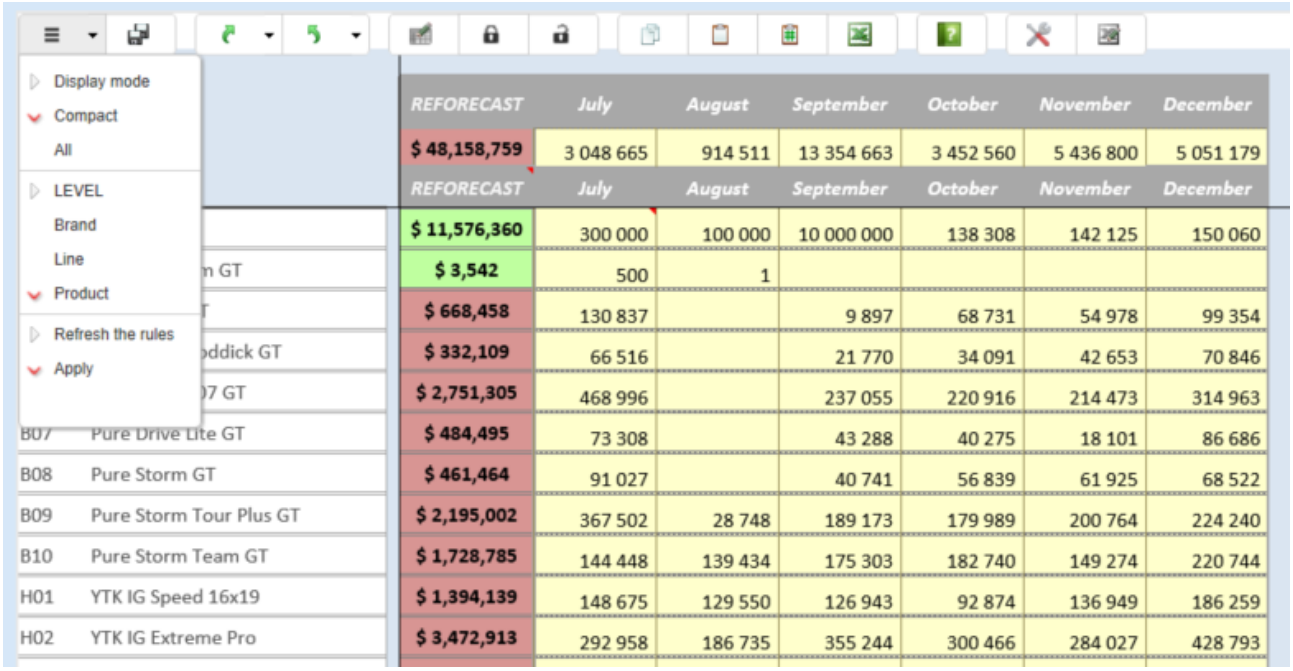
Reforecast

This is the most intuitive way to re-forecast a running budget in a full integrated layout where you can:

- Close months when actuals are available, automatically locking the input for Actual cells.
- Edit remaining months, by cell or global actions
- Immediately display the Actual + Forecast by product, line or brand, and totals
- Highlight where the forecast achieves the initial budget target
- Focus the reforecast display and cells input, leveraging the Qlik current selection.



Select a compact display to report the new budget for the remaining months:



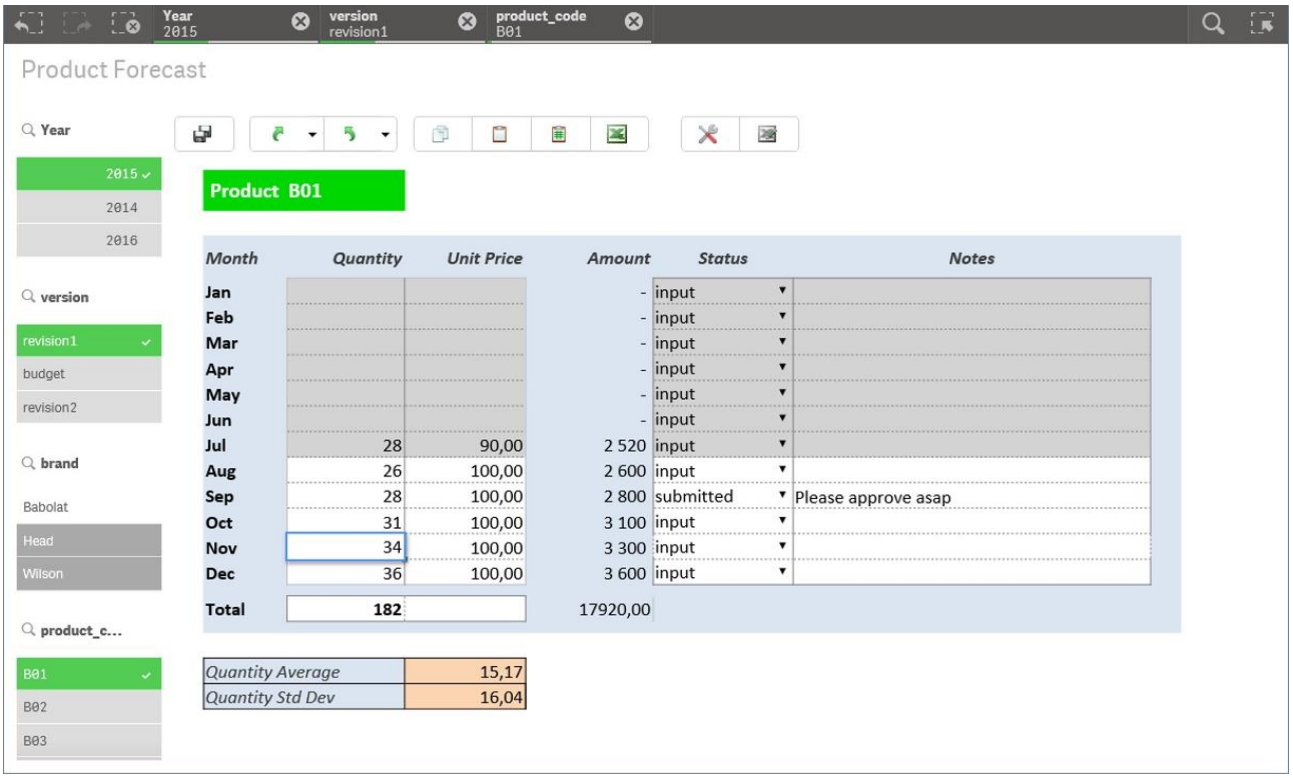
		REFORECAST	July	August	September	October	November	December
		$ 48,158,759	3 048 665	914 511	13 354 663	3 452 560	5 436 800	5 051 179
		REFORECAST	July	August	September	October	November	December
		$ 11,576,360	300 000	100 000	10 000 000	138 308	142 125	150 060
	n GT	$ 3,542	500	1				
		$ 668,458	130 837		9 897	68 731	54 978	99 354
	ddick GT	$ 332,109	66 516		21 770	34 091	42 653	70 846
	7 GT	$ 2,751,305	468 996		237 055	220 916	214 473	314 963
B07	Pure Drive Lite GT	$ 484,495	73 308		43 288	40 275	18 101	86 686
B08	Pure Storm GT	$ 461,464	91 027		40 741	56 839	61 925	68 522
B09	Pure Storm Tour Plus GT	$ 2,195,002	367 502	28 748	189 173	179 989	200 764	224 240
B10	Pure Storm Team GT	$ 1,728,785	144 448	139 434	175 303	182 740	149 274	220 744
H01	YTK IG Speed 16x19	$ 1,394,139	148 675	129 550	126 943	92 874	136 949	186 259
H02	YTK IG Extreme Pro	$ 3,472,913	292 958	186 735	355 244	300 466	284 027	428 793

Product forecast

This Sense demo could be used by a sales rep on the field, using a connected tablet to forecast Sales by product. Data entry by Quantity and Unit Price.

Actual months are automatically locked.

The status makes Sales reps easily collaborate with the Team leader at the head-office. E.g. requesting an approval before setting a promotional unit price. The Notes field allows large text entry.



If the tablet cannot be connected, the job can be achieved in an Excel sheet. When back online, the Smart Paste tool in the toolbar will easily import the Excel inputs in K4 in the Qlik document to be then saved in the database.

Human resources (HR)

This demo manages employees FTE (Full Time Equivalent) by month and yearly pay increase, variable and bonus. The grid is filtered by Division to select the employees.

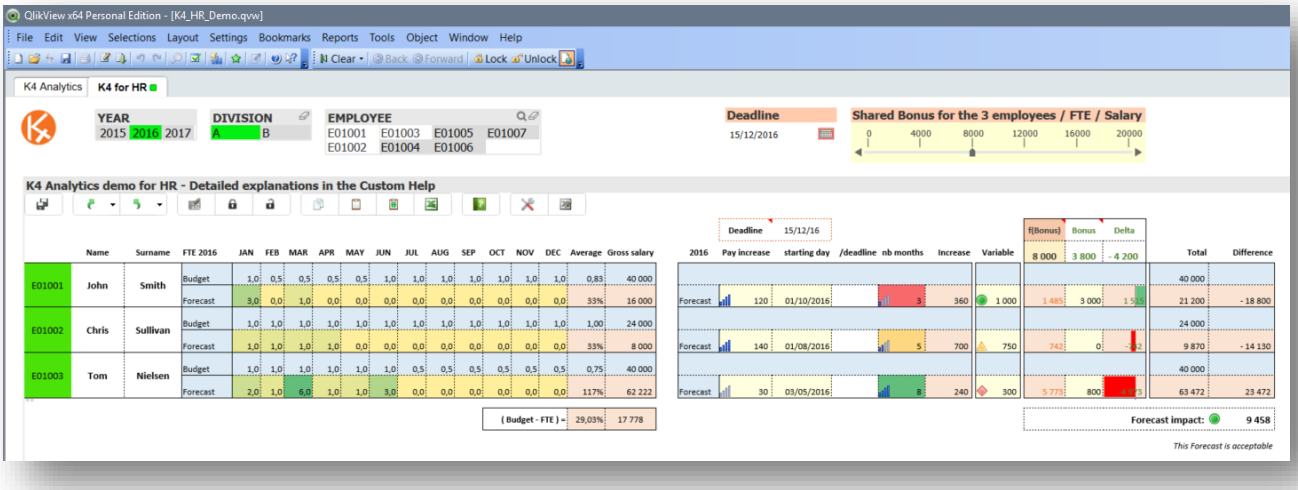
The user can input the FTE forecast by cells or use Smart Data Entry to copy from the initial FTE budget with a multiplier. The Gross Salary total is impacted by the FTE.

The pay increase is limited by a threshold set in the Qlik document.

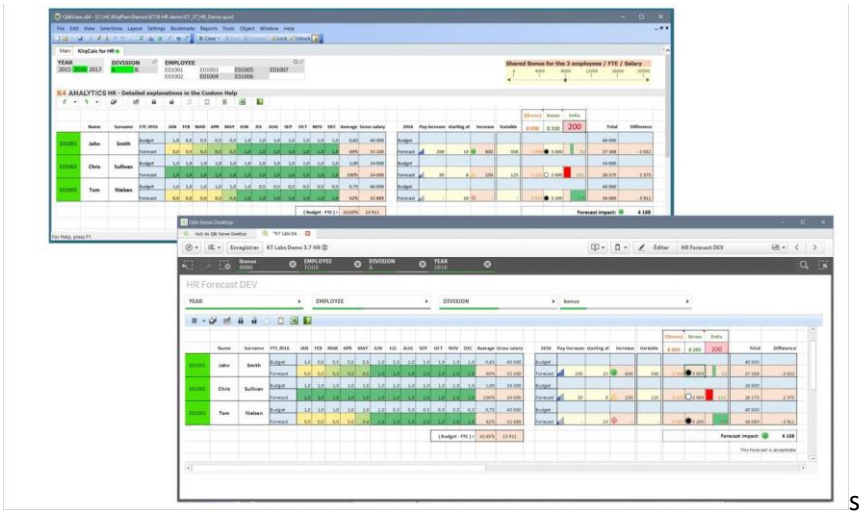
The bonus calculation spreads the global bonus set in the Qlik document, split by employee according to excel formulas live in the grid. The proposed bonus may be over-assigned in the next column.

The forecast input will not be saved until the over-assigned bonus respect the global bonus and if the global reforecast exceeds the initial global budget (validation rule).

All inputted cells and formula calculations are saved to the SQL buffer tables, ready to be exported in the enterprise database.



A mix of QlikView and Qlik Sense users can share the same application contributing to the same database:



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