

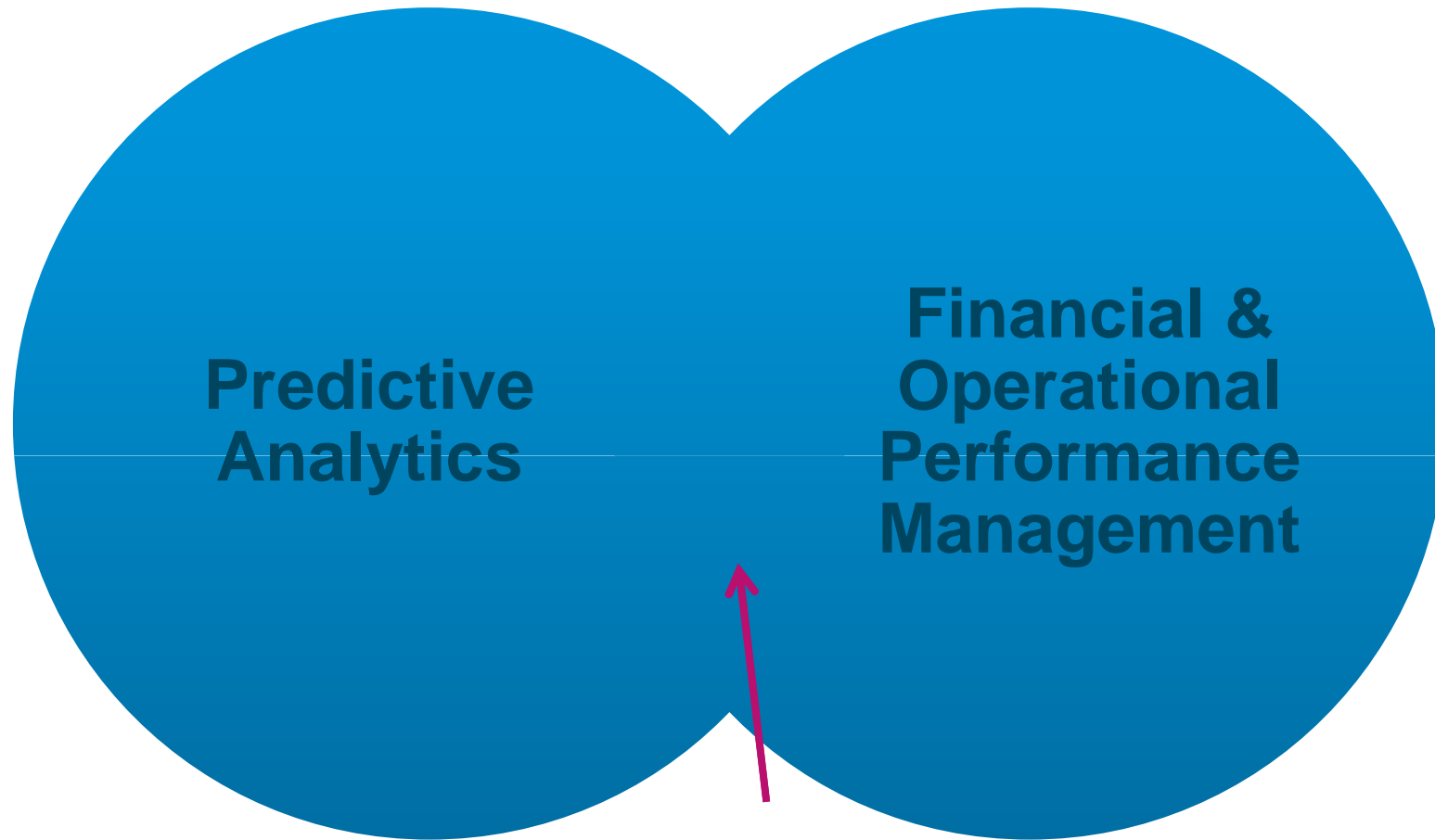
**Martijn Wiertz**

IBM SWG Business Analytics, Predictive Analytics

[martijnwiertz@nl.ibm.com](mailto:martijnwiertz@nl.ibm.com)

# Predictive Planning – improve business planning with forecasting and predictions





**“Predictive  
Planning”**



**"How should you respond when you get powerful new tools for finding answers?  
*Think of harder questions.*"**

*Clive Thompson – Smarter Than You Think:  
How Technology is Changing Our Minds for the Better  
(William Collins – September 2013)*



## Harder questions...

If I could accurately predict...	Then I could...
Sales for every SKU in every store	Reduce supply chain expenses and increase sales
End-of-month revenue attainment based on performance to date	Apply resources and attention where it is most needed
Day Sales Outstanding for every individual invoice	Better manage my working capital
The likelihood of cancellation for every individual customer	Set the marketing budget appropriately
The impact of these proposed changes on the company's KPIs	Pick the best option and avoid surprises



---

What would you change if you could...

Predict more **accurately**

Predict more **granularly**

**Assess impact** of proposed  
changes before implementation



## Customers are doing this now

	<ul style="list-style-type: none"> <li>• Monthly and daily cashflow predictions, integrated with actuals</li> <li>• Near-real-time visibility into all business operations – Instant insight into the ramifications of decisions without waiting</li> <li>• What-if analysis for stronger business cases and justifications</li> </ul>
<p>ELIE TAHARI</p>	<ul style="list-style-type: none"> <li>• Ability to predict customer orders four months in advance with better than 97% annual accuracy</li> <li>• 30% reduction in supply chain and logistics costs.</li> <li>• Reduction in the proportion of shipments sent by air freight from 80% to less than 50%</li> <li>• Increased sales and stronger margins</li> </ul>
	<ul style="list-style-type: none"> <li>• Accurately forecast business demand</li> <li>• Reduces costs associated with under-stocked and over-stocked products</li> <li>• Increase sales revenue by enabling it to accommodate the seasonally evolving needs of its customers.</li> </ul>



“We’ve built a very accurate model for *mid-month and month-end cash forecasting* that uses regression analysis to show us what our cash requirements are likely to be over the coming weeks and months.

When our forecasts relied more on the opinions of financial experts, we used to have to keep a ‘cushion’ of a few million dollars in case their estimates were wrong. **Now we have much more confidence in the forecasts, so the cushion can be much smaller.”**

*Patrick Neeley, Chief Financial Officer,  
Chickasaw Nation Division of Commerce*



## So how do they do this?

Integrate predictive analytics in the planning process

- Analytics deliver a “starter for 10” planning
- Based on proven patterns found in the data
- Domain experts adjust as needed

Use sophisticated forecasting algorithms

- ARIMA, Exponential Smoothing
- Automatically pick the best model
- Monte Carlo simulation

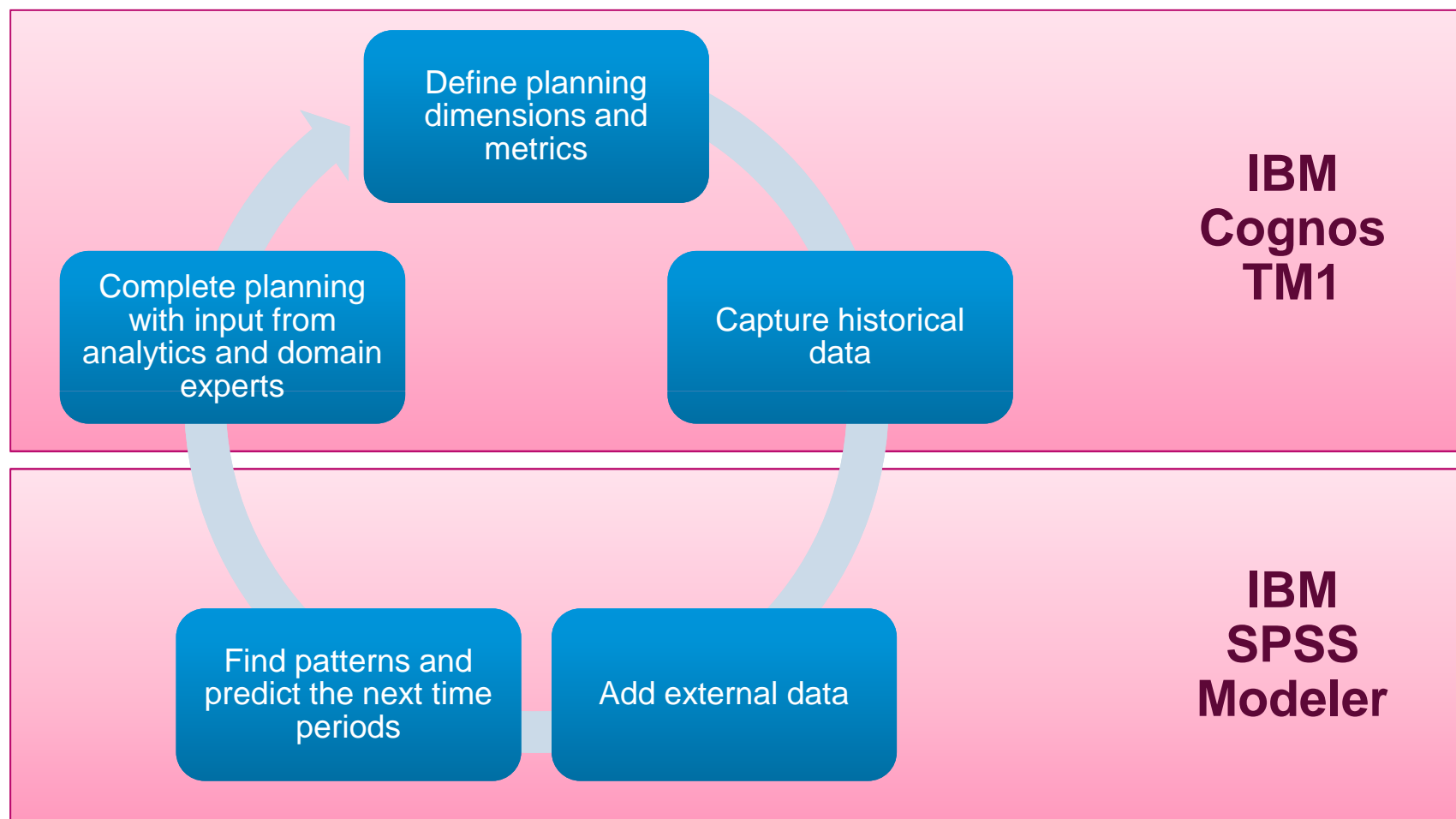
Add external predictors

- Economic indicators
- Own and competitor activities
- Weather
- Etcetera





## How IBM technology supports this



# PREDICTIVE PLANNING IN ACTION



IBM Concert > Home



ACTIVITIES & ALERTS

- You reset the task Revenue Plan Adjustments
- You reset the subtask Complete Task
- You reset the task Product Profitability Scorecard
- You reset the subtask Complete Task
- You reset the task Corporate Dashboard
- You reset the subtask Complete Task
- You completed the task Revenue Plan Adjustments
- You completed the subtask Complete Task
- You completed the task Product Profitability Scorecard
- You completed the subtask Complete Task
- You completed the task Corporate Dashboard
- You completed the subtask Complete Task
- You updated the process list Performance Review
- You updated due date in task Inform Management on Plan Changes
- You updated due date in task Update the Financial Report Book
- You updated due date in task Plan Transportation Costs
- You updated due date in task Component Cost Scenarios

PROCESS LIST STATUS

- 2** 2013 Expense Budget  
Adjust Cost Center Headcount due in 2 days
- 2** Performance Review  
4 Tasks due in 2 days
- 3** 2013 Expense Budget  
2 Tasks due in 3 days
- 3** Allocations  
Corporate Allocations due in 3 days
- 6** 2014 Plan  
Review Basic Templates due in 6 days
- 15** 2014 Plan  
Update Forecast due in 15 days

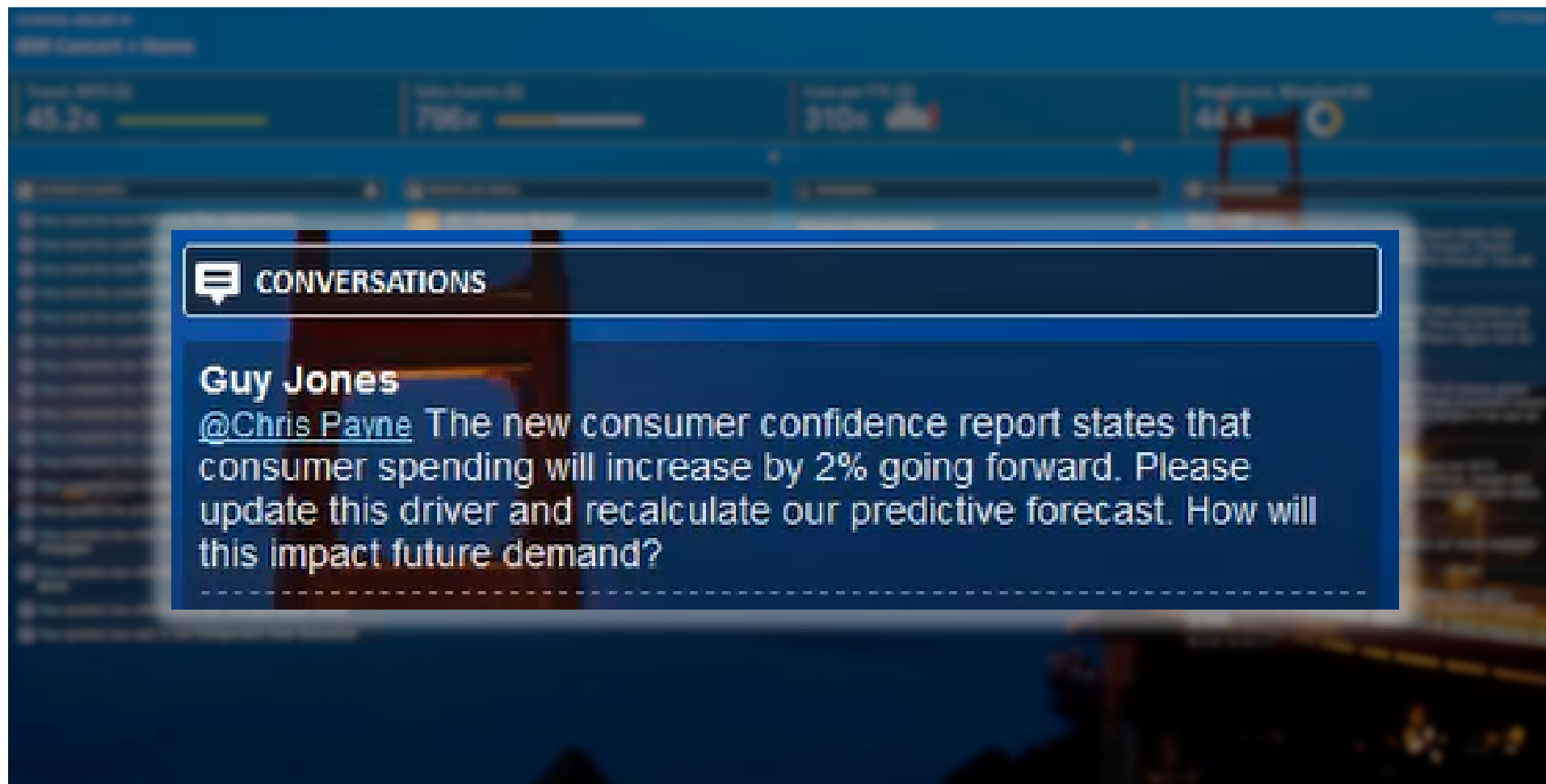
BOOKMARKS

- Smartco Administration
- Performance Review
- Allocations
- 2013 Expense Budget
- Download Latest Financial Report Book (Word).docx

CONVERSATIONS

- Guy Jones**  
@Chris Payne The new consumer confidence report states that consumer spending will increase by 2% going forward. Please update this driver and recalculate our predictive forecast. How will this impact future demand?
- Guy Jones**  
@Chris Payne Our social media analysis shows that customers are not happy with our current 4G phone lineup. This may be what is causing our revenue issues. We need to introduce higher end 4G phone models.
- Maurice Martin**  
@Chris Payne The latest IDC report predicts that 4G phone global demand will increase by 20%. I need you to create a scenario based on what happens to bill of materials costs and margins if we see an increase in 4G chip costs of 12%.
- Maurice Martin**  
@Chris Payne The CEO called. He is asking about our 2012 performance details. What happened to our revenue, margin and net profit? How are we trending? We need a turnaround plan within 48 hours.
- Chris Payne**  
@Guy Jones @Maurice Martin Should we continue our share buyback program to meet our EPS targets?
- Steve Brown**  
Thanks for the hard work all this time team. @Man Smith @Irina Sinkovitch When can we expect your results, the deadline is coming up fast!





The image shows a blurred background of a business dashboard with various charts and data points. Overlaid on this is a chat window titled "CONVERSATIONS". The chat message is from "Guy Jones" (@Chris Payne) and discusses a 2% increase in consumer spending and its impact on predictive forecasts.

**CONVERSATIONS**

**Guy Jones**  
[@Chris Payne](#) The new consumer confidence report states that consumer spending will increase by 2% going forward. Please update this driver and recalculate our predictive forecast. How will this impact future demand?



FOPM Demo Final

https://demo.concert1.ibmcloud.com/template/processlist/26/task/84

BI Mobile TM1 - My Applications TM1 Web TM1 Ops Console Users & Groups

IBM Concert

Chris Payne

Process Lists Administration

Performance Review

Predictive Forecasting - External Factors Run Prediction

Version Predictive Month Jun

	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13			
Business Days	21.00	20.00	23.00	21.00	21.00	22.00	20.00	23.00	21.00	21.00	20.00	20.00	22.00	21.00	22.00	21.00	23.00	21.00	22.00	23.00	20.00	23.00	22.00	21.00	23.00	20.00	22.00	21.00	23.00	20.00
Consumer Spending	106.20	106.30	106.70	106.80	106.20	106.40	106.80	106.40	107.10	108.20	108.20	107.90	108.80	109.50	109.70	110.00	109.90	118.85	119.61	119.83	120.69	120.47	121.23	121.67	121.88	122.31	122.31	122.31	122.31	122.31
Inflation	1.60	2.10	2.70	3.20	3.60	3.60	3.60	3.80	3.90	3.50	3.40	3.00	2.90	2.90	2.70	2.30	1.70	1.70	1.40	1.70	2.00	2.20	1.80	1.70	1.60	2.00	2.00	2.00	2.00	
Unemployment	9.10	9.00	8.90	9.00	9.00	9.10	9.00	9.00	9.00	8.90	8.60	8.50	8.30	8.30	8.20	8.10	8.20	8.20	8.20	8.10	7.80	7.90	7.80	7.80	7.90	7.70	7.70	7.70	7.70	7.70

Subtask Description

Percent Change

% Change 2

Extend

Left  Right  Up  Down

Update Action

Replace  Add  Subtract

Apply Cancel

Prediction Drivers Results Updated Results

15:57

10:30 AM

Activities Conversations Metrics

Sales Forecast

Enter your comment here

Filtering ON: Me

Guy Jones @Chris Payne The new consumer confidence report states that consumer spending will increase by 2% going forward. Please update this driver and recalculate our predictive forecast. How will this impact future demand? Jan 21

Guy Jones @Chris Payne Our social media analysis shows that customers are not happy with our current 4G phone lineup. This may be what is causing our revenue issues. We need to introduce higher end 4G phone models. Jan 21

Maurice Martin @Chris Payne The latest IDC report predicts that 4G phone global demand will increase by 20%. I need you to create a scenario based on what happens to bill of materials costs and margins if we see an increase in 4G chip costs of 12%. Jan 21

Maurice Martin @Chris Payne The CEO called. He is asking about our 2012 performance details. What happened to our revenue margin and net profit? How are we trending? We need a turnaround plan within 48 hours. Jan 21



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BI Mobile TM1 - My Applications TM1 Web TM1 Ops Console Users & Groups

IBM Concert Chris Payne

Process Lists Administration

Performance Review

Predictive Foreca... **Predictive Forecasting - External Factors** Run Prediction

Version Predictive Month Jun

	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13
<b>Business Days</b>	21.00	20.00	23.00	21.00	21.00	22.00	20.00	23.00	21.00	21.00	20.00	20.00	22.00	21.00	22.00	21.00	23.00	21.00	22.00	23.00	20.00	23.00	22.00	21.00	23.00	20.00	20.00
<b>Consumer Spending</b>	106.20	106.30	106.70	106.80	106.20	106.40	106.80	106.40	107.10	108.20	108.20	107.90	108.60	109.50	109.70	110.00	109.90	121.23	122.00	122.22	123.11	122.88	123.66	124.10	124.32	124.76	125.10
<b>Inflation</b>	1.60	2.10	2.70	3.20	3.60	3.60	3.60	3.80	3.90	3.50	3.40	3.00	2.90	2.90	2.70	2.30	1.70	1.70	1.40	1.70	2.00	2.20	1.80	1.70	1.60	2.00	
<b>Unemployment</b>	9.10	9.00	8.90	9.00	9.00	9.10	9.00	9.00	9.00	8.90	8.60	8.50	8.30	8.30	8.20	8.10	8.20	8.20	8.20	8.10	7.80	7.90	7.80	7.80	7.90	7.70	

Subtask Description

Prediction Drivers Results Updated Results

16:14

Activities Conversations Metrics

Sales Forecast

Enter your comment here

Filtering ON: Me

Guy Jones @Chris Payne The new consumer confidence report states that consumer spending will increase by 2% going forward. Please update this driver and recalculate our predictive forecast. How will this impact future demand? Jan 21

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FOPM Demo Final

https://demo.concert.ibmcloud.com/template/processlist/26/task/84

IBM Concert

Chris Payne

Process Lists Administration

Performance Review

Predictive Forecasting - Results

Organization: Total Company Channel: Channel Total Revenue: Units Sold Product Total: Product Total

Predictive Forecast Updated

	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12
Budget	19,816	20,825	20,485	20,459	20,304	19,406	21,035	20,946	25,431	25,749	26,082	26,627	24,630	24,523	24,344	23,656	23,580	23,708	24,640
Actual	34,934	22,634	22,316	22,319	22,205	21,352	21,314	21,236	25,617	25,935	26,269	26,780	19,672	20,058	20,221	21,223	20,983	22,030	21,640
Predictive	34,902	22,602	22,284	22,287	22,173	21,320	21,282	21,204	25,585	25,903	26,237	26,748	19,643	20,029	20,192	21,184	20,954	30,541	31,220
Predictivev2	34,899	22,599	22,283	22,284	22,170	21,319	21,282	21,204	25,585	25,903	26,237	26,749	19,585	19,971	20,134	21,158	20,896	21,943	21,550

Subtask Description

Activities Conversations Metrics

Sales Forecast

Filtering ON: Me

Guy Jones @Chris Payne The new consumer confidence report states that consumer spending will increase by 2% going forward. Please update this driver and recalculate our predictive forecast. How will this impact future demand?

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Maurice Martin @Chris Payne The CEO called. He is asking about our 2012 performance details. What happened to our revenue, margin and net profit? How are we trending? We need a turnaround plan within 48 hours.

16:17

10:30 AM



FOPM Demo Final

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BI Mobile TM1 - My Applications TM1 Web TM1 Ops Console Users & Groups

IBM Concert Chris Payne

Process Lists Administration

Performance Review

Predictive Foreca... Complete Task

ct Total

Subtask Description

	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13
Budget	20,946	25,431	25,749	26,082	26,627	24,830	24,523	24,344	23,656	23,580	23,708	24,640	25,465	24,765	26,604	29,745	31,553	21,721	21,870	21,876
Actual	21,236	25,617	25,935	26,269	26,780	19,672	20,058	20,221	21,223	20,983	22,030	21,646	20,359	18,477	17,766	19,417	21,125	20,817	20,806	20,805
Predictive	21,204	25,585	25,903	26,237	26,746	19,643	20,029	20,192	21,194	20,954	30,541	31,222	31,368	31,383	31,833	32,211	32,384	33,034	32,828	33,477
Predictivev2	21,204	25,585	25,903	26,237	26,749	19,585	19,971	20,134	21,136	20,896	21,943	21,559	20,839	25,184	25,387	25,556	25,690	23,208	20,353	20,155

Prediction Drivers Results Updated Results

16:25

Activities Conversations Metrics

Sales Forecast

Enter your comment here

Filtering ON: Me

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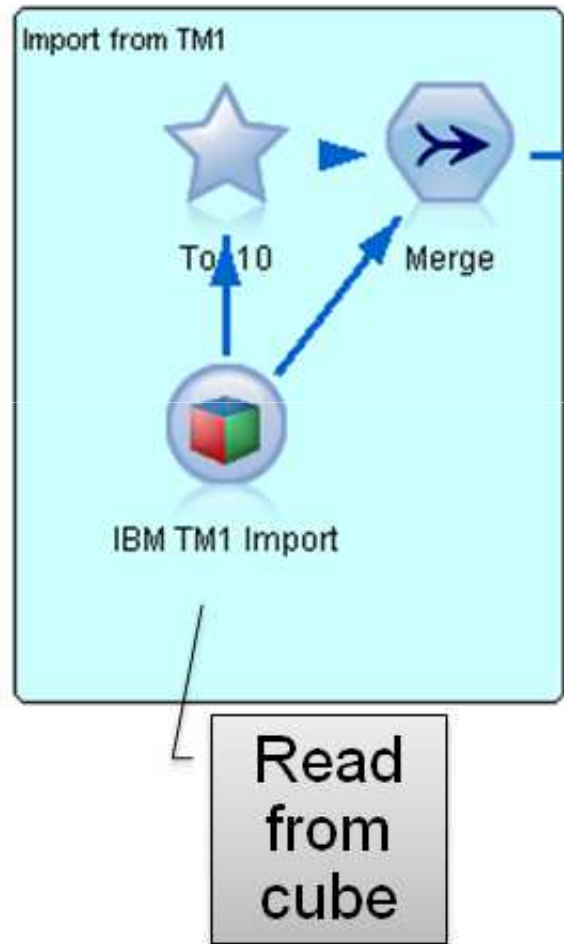


## How it works behind the scenes

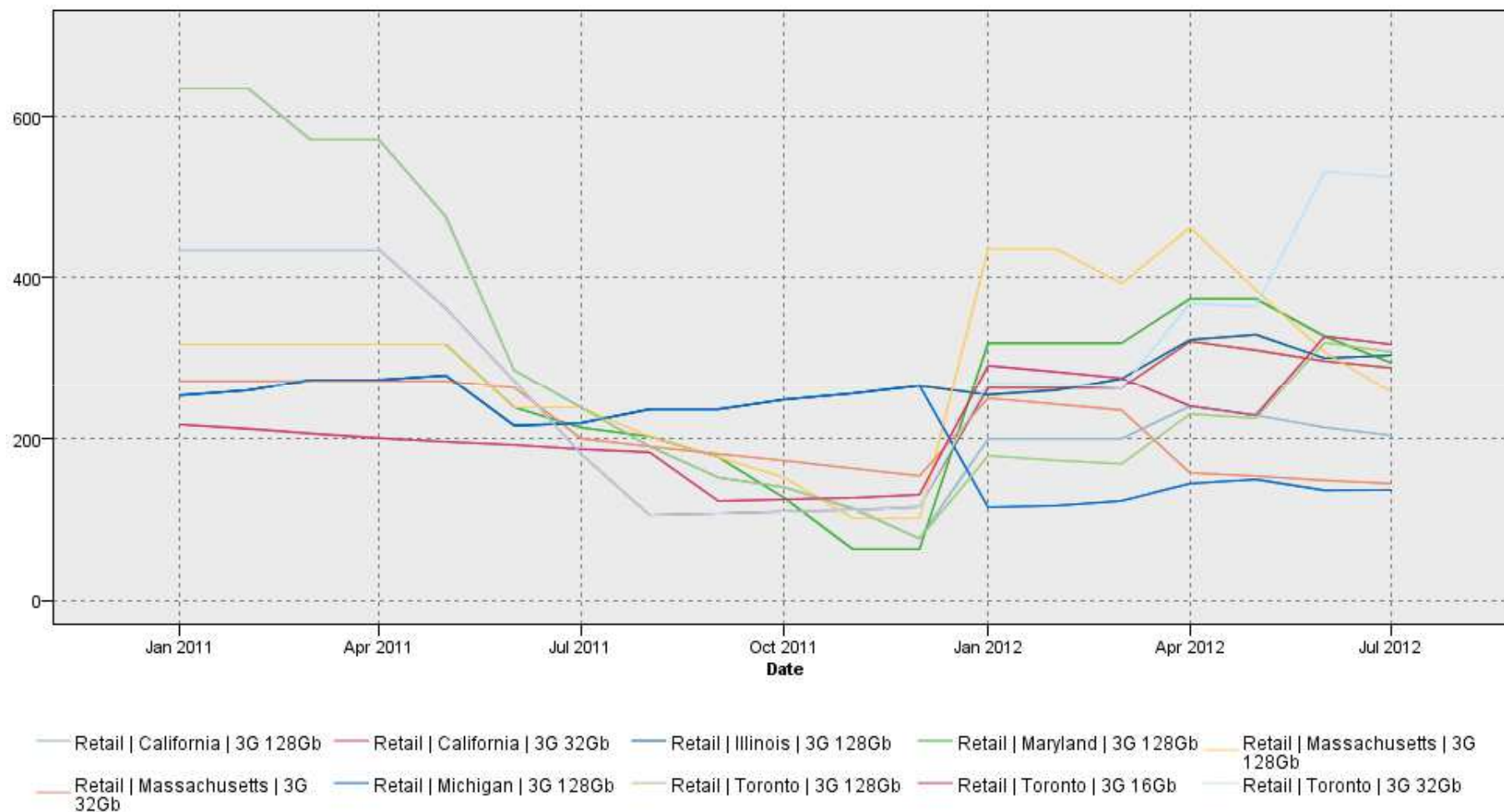
- We will go over a 5 step process to accurate forecasts:
  - Step 1: We will import data into SPSS Modeler from TM1 in order to develop a more accurate forecast
  - Step 2: We will examine the traditional trend lines
  - Step 3: We will develop the high quality forecast using SPSS Modeler invoking expert forecasting algorithms and adding external predictors
  - Step 4: We will review the accuracy of the forecasts in SPSS Modeler
  - Step 5: We will push these results back to TM1



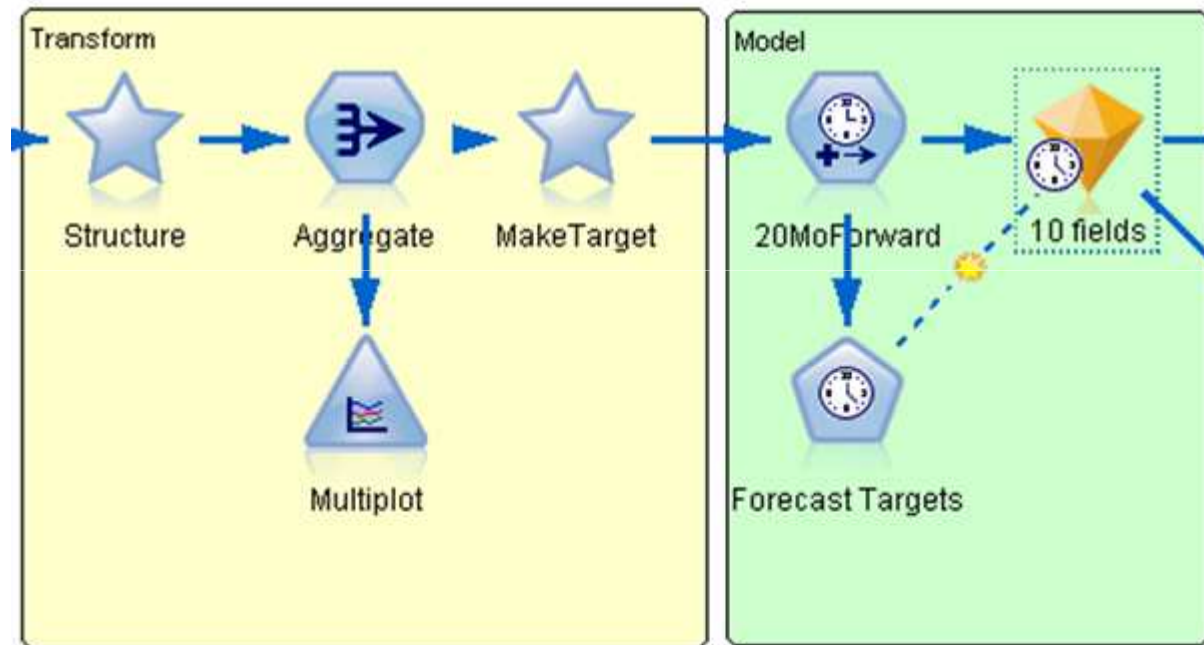
**Step 1: We will push data from TM1 into SPSS Modeler in order to develop a more accurate forecast**



## Step 2: We will first examine the accuracy of the forecast in TM1

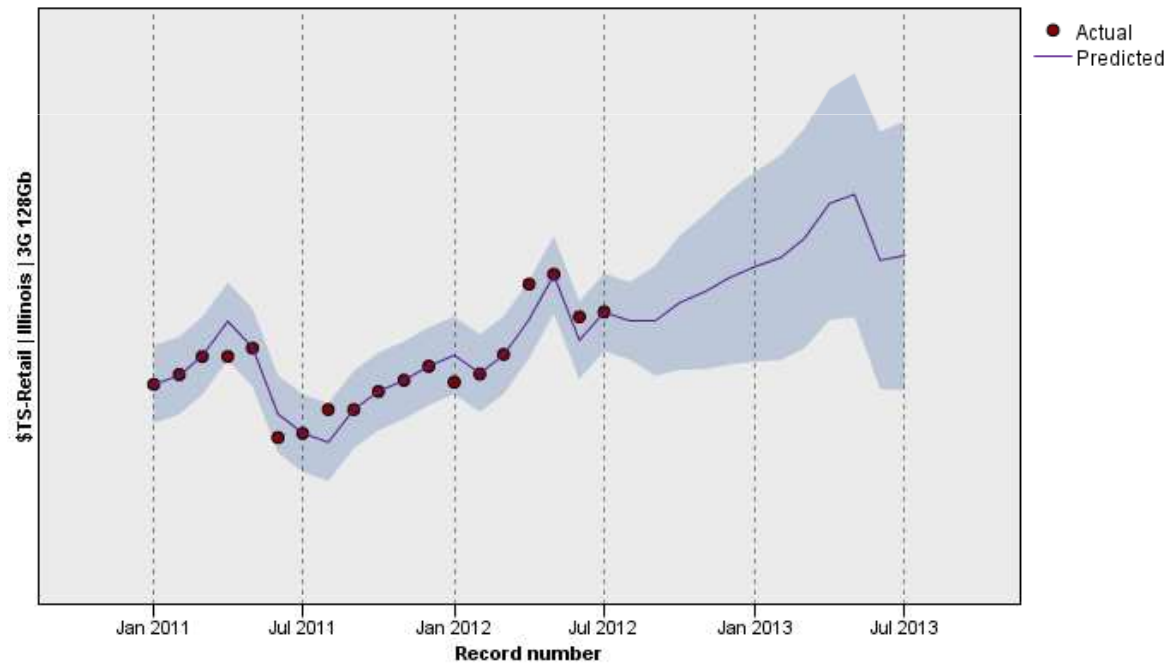


**Step 3: We will develop the high quality forecast using SPSS Modeler invoking expert forecasting algorithms and adding external predictors**



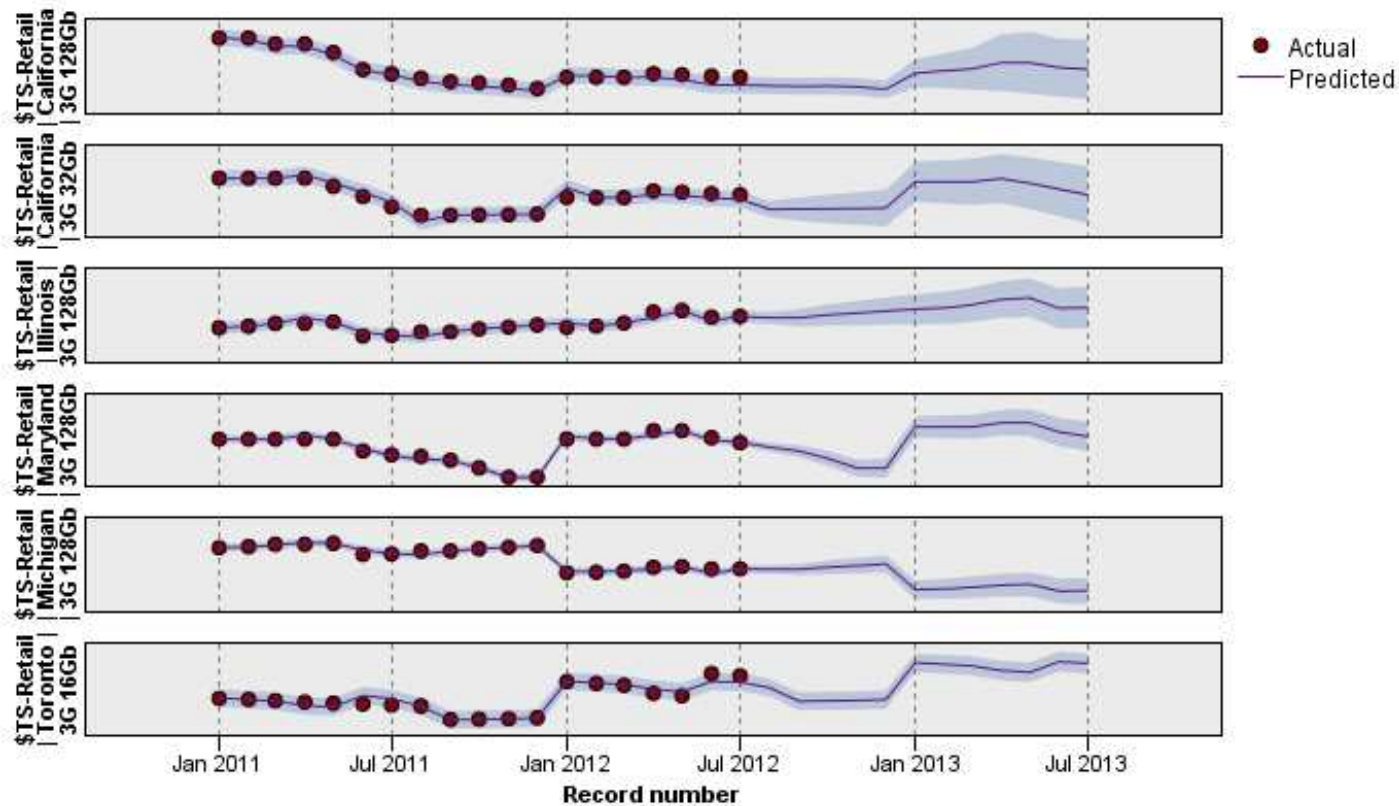
## Step 4: Forecast for one product in a channel

- Seasonality reflected in predicted trend line
- Dark grey band represents the upper & lower confidence of prediction
  - This gives analyst insight into quality of supply chain predictability



## Step 4: Forecast for multiple products across a channel

- Forecast can be created for any type of time series data set



## Step 4: Output Statistics

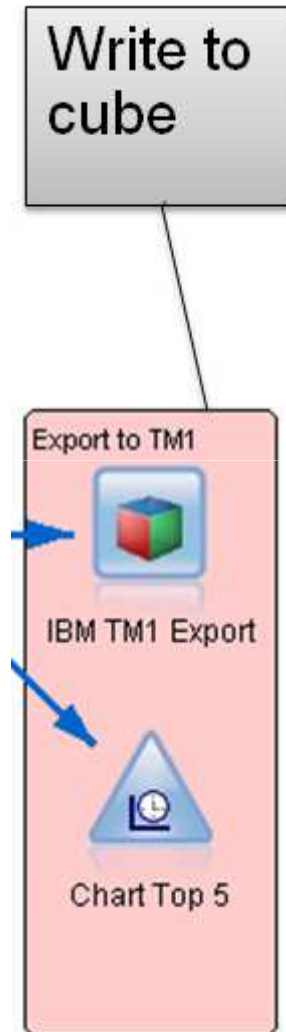
Model	Parameters	Residuals	Summary	Settings	Annotations	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sort by	Selected	View: Advanced		
Number of records used in estimation: 19						
	Target	Model	Predictors	StationaryR**2	R**2	RMSE
<input checked="" type="checkbox"/>	Retail   California   3G 128Gb	Winters multiplicative	0	-0.23	0.949	44.067
<input checked="" type="checkbox"/>	Retail   California   3G 32Gb	Simple seasonal	0	0.277	0.922	34.39
<input checked="" type="checkbox"/>	Retail   Illinois   3G 128Gb	Winters additive	0	0.626	0.851	12.767
<input checked="" type="checkbox"/>	Retail   Maryland   3G 128Gb	Winters additive	0	0.664	0.983	13.495
<input checked="" type="checkbox"/>	Retail   Massachusetts   3G 128Gb	Winters multiplicative	0	0.636	0.973	18.983
<input checked="" type="checkbox"/>	Retail   Massachusetts   3G 32Gb	Simple seasonal	0	0.745	0.879	18.38
<input checked="" type="checkbox"/>	Retail   Michigan   3G 128Gb	Winters additive	0	0.695	0.972	10.916
<input checked="" type="checkbox"/>	Retail   Toronto   3G 128Gb	ARIMA(0,1,0)	0	0.0	0.847	66.457
<input checked="" type="checkbox"/>	Retail   Toronto   3G 16Gb	Winters additive	0	0.751	0.924	18.566
<input checked="" type="checkbox"/>	Retail   Toronto   3G 32Gb	Simple	0	-0.005	0.768	70.74
Summary Statistics						
	Statistic	StationaryR**2	R**2	RMSE	MAPE	MAE
SUMMARY	MEAN	0.416	0.907	30.876	8.361	19.0
SUMMARY	SE	0.371	0.069	22.408	6.22	14.0
SUMMARY	MINIMUM	0.23	0.768	10.916	2.487	6.0

- Unique algorithm and forecast is created per channel (Model column)
- Stationary R\*\*2 is a measure of accuracy, closer to 1 is good.
- Its an estimate of the proportion of the total variation in the series that is explained by the model.

- The statistical output gives an analyst great information, even if the numbers are 'bad'
  - Good = Potentially means marketing is working in the channel
  - Bad = Evidence of turmoil in supply chain, opportunity for discovery



## Step 5: We will push these results back to TM1





# Acting on the new insights

## Changes to the Plan

To address our revenue and net profit performance issues I made the following changes to the plan.

### Revenue Plan Changes

1. Based our social media and marketing data I created a new 4G 64Gb phone model to address customer demand.
2. The 4G 64Gb phone has a retail price of \$185. I based the drivers for the new phone off our old 3G 64Gb model.
3. For the year I entered a demand forecast for the new model consisting of 32,000 units for the entire company.
4. We should continue to define the demand forecast based on regional sales trends and promotions.
5. If we meet our targets for this new phone model we should see substantial performance to both revenue and net profit.

### Predictive Forecast Changes

1. Based our latest economic driver forecasts we expect to see a 2% increase in consumer spending.
2. I applied this driver change and recalculated our predictive forecast leveraging our history, latest economic drivers and the addition of our new 4G 64Gb phone model.
3. Our latest predictive forecast shows an increase in units sold, revenue and net profit starting in June 2012.
4. The predictive forecast also shows that our demand for PCs and 3G phones will continue to decrease as our tablet and 4G phone businesses grow. We should immediately take action to cut component orders and lower manufacturing targets for these slow growth product segments.

### Operational Forecast Changes

1. Based on the addition of our new 4G model, our updated predictive forecast results and analyst



## Summary

- Harder planning questions can now be answered
  - Integrate predictive analytics in the planning process
  - Use advanced techniques to get accurate and granular forecasts
  - Add external data to improve the forecasts
- Leading companies have started on this journey already with quick benefits
- The technology is ready to support this
- *What hard planning question would you like to answer next?*



# Questions?

