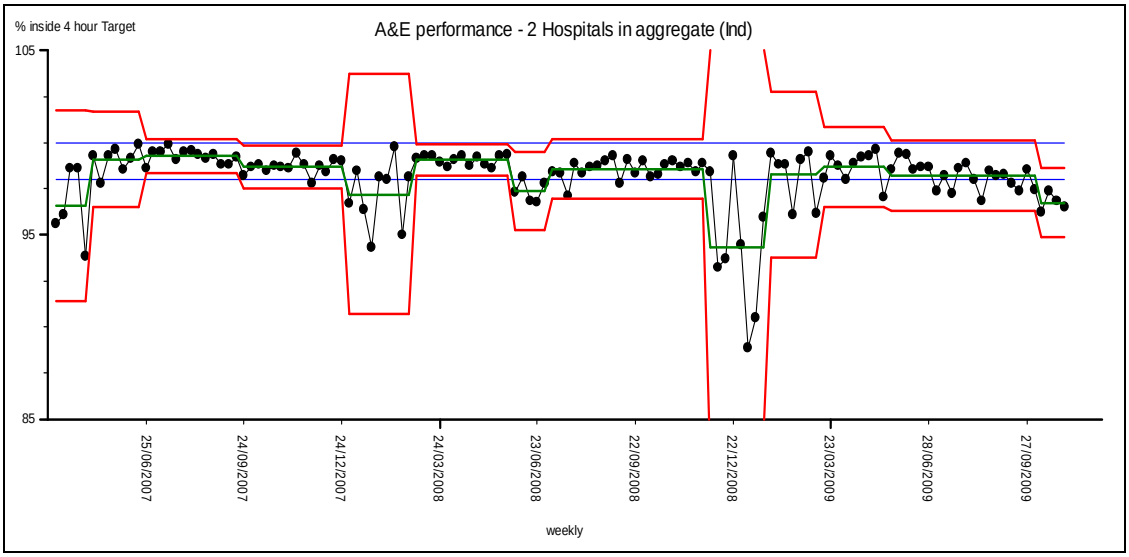
BaseLine© Examples

G. Using BaseLine© as a "Deviation from Aim" chart – to handle cyclic patterns e.g. seasonality in your data – diagnostically and prognostically.

People who are using BaseLine© or any other system/ process behaviour charting for the first time, may be worried that the variation they're plotting contains cyclical or seasonal influences – somehow reducing the power of their chart. **Example E** illustrates how BaseLine© can reveal any anticipated cyclicality by using the "Group column" in the data Window. Here, we want to show how a specific kind of cyclical pattern: "seasonality" may also be handled.

1. As always, start with any **historical data** you have to hand, and **paste** it into BaseLine© - so that you can begin to study the historical behaviour of your system – and to sense the systemic shifts that have taken place.
Using BaseLine© diagnostically in this way is always the best place to start. If you suspect that there may be some seasonality in your data that might be clouding the variation in which you're most interested, then you have the beginnings of a hypothesis about the variation you are seeing.

In the example below, the data that's to hand is an aggregate of two Accident & Emergency departments – the percentage of patients that are processed within 4 hours – data that's been collected because the Government were at this time requiring this particular statistic to be reported upon.



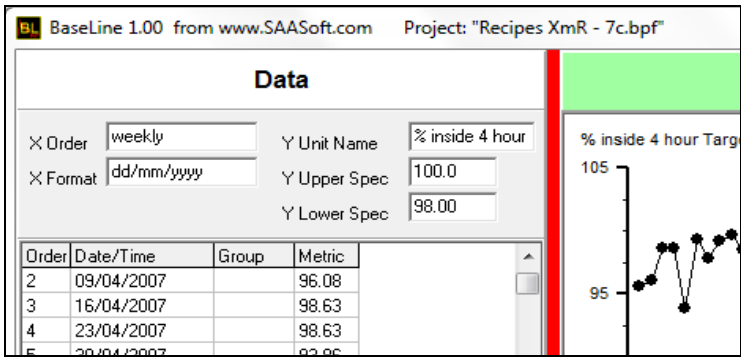
Summary

	Segment	Start	Finish	Mean	Sigma	Count	LCL	UCL	Stable
1	02/04/2007	30/04/2007		96.56	1.731	5	91.37	101.8	Yes
2	07/05/2007	18/06/2007		99.08	0.866	7	96.48	101.7	Yes
3	25/06/2007	17/09/2007		99.26	0.306	13	98.34	100.2	Yes
4	24/09/2007	24/12/2007		98.67	0.385	14	97.52	99.8	Yes

5	31/12/2007	25/02/2008	97.19	2.166	9	90.69	103.7	Yes
6	03/03/2008	26/05/2008	99.05	0.288	13	98.19	99.9	Yes
7	02/06/2008	30/06/2008	97.37	0.709	5	95.24	99.49	Yes
8	07/07/2008	24/11/2008	98.57	0.524	21	97.00	100.1	Yes
9	01/12/2008	19/01/2009	94.30	3.649	8	83.36	105.2	Yes
10	26/01/2009	09/03/2009	98.27	1.491	7	93.80	102.7	Yes
11	16/03/2009	17/05/2009	98.69	0.728	9	96.51	100.9	Yes
12	24/05/2009	04/10/2009	98.21	0.629	20	96.32	100.1	Yes
13	11/10/2009	01/11/2009	96.73	0.618	4	94.87	98.50	Yes

Note: The Primary Care Trust that commissions the two services, and has to report the data, were being required to ensure that at least 98% of patients are seen within the 4 hour target. The two blue horizontal lines show this 98% specification, together with the 100% line that indicates perfect performance.

You can insert specification limits by ticking the box ☑ "Show Specification" under the Chart, having first entered the spec limits:



2. Try to state clearly what your **hypothesis** is – and make it explicit to everyone involved by writing it down and communicating it. The data in the example covers 135 weeks, or about 2½ years, and performance in the Christmas period looks to be poor relative to the rest of the year, but there are also other difficult periods that several people working in or on the system think might be related to some kind of annual cyclicality.

After considerable discussion, a number of opinions are collected from people who believe they know the system. A hypothesis is agreed and published:

"Whilst A&E can at times feel chaotic we believe that winter periods are particularly hard to manage, especially if a winter virus hits us. The decline in performance generally starts around early October and then worsens again in early December, eventually recovering by mid February."

The purpose of BaseLine©, and of System Thinking, is to enable **exploration of systemic variation and its causes**. Once you think you understand some of causes, you can take action to mitigate its effects.

Each action should be treated as a systemic intervention, and monitored as an experiment that has been purposefully designed. BaseLine© enables you to do this monitoring – see example F which describes how to intervene **prognostically**. The outcome of the experiment is never exactly as predicted, but learning is nearly always abundant.

3. By applying a prognostic approach to the A&E System, the on-going conversations that are had concerning the nature of the variation – its causes and predictabilities – makes it possible over the months and years to bring about a wide variety of beneficial change – not least to the way that each season is forecast and planned for.

A highly effective way of encouraging everyone to plan more effectively is to collectively agree a prediction of demand. In this example, it would be best to do this with the full co-operation of each of the two A&E departments – and to establish the monitoring of a number of metrics e.g. the rate of demand, and the waiting time for each patient.

In the example, all we have is a commissioner with the crudest of performance data. Even with this data however, it is possible to get more predictive.

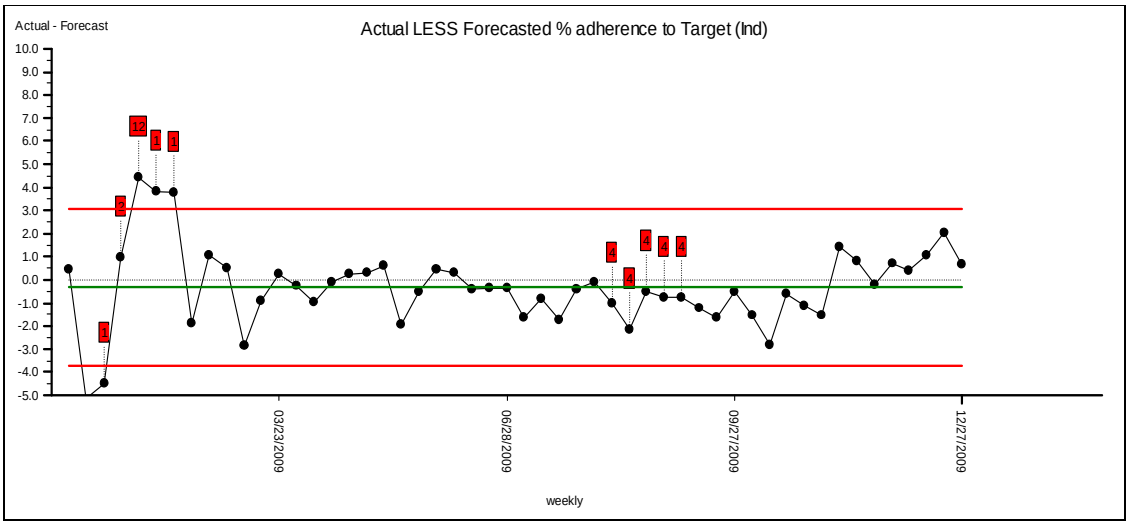
4. Here is part of the spreadsheet that the Commissioner compiled after a conversation with their 2 Provider A&E departments. Collectively they have made a forecast of the expected % adherence to the 4hr target.

Notice that it's set-up to calculate the difference between what is being forecast and the actual performance – conventionally the SPC term for this is "**Deviation from Aim**."

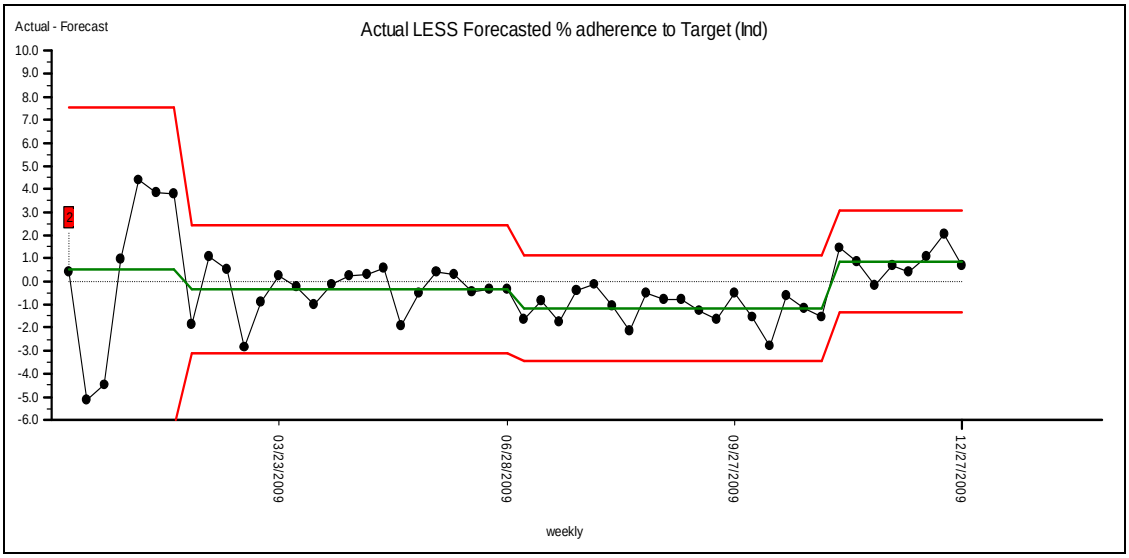
By pasting the differences into BaseLine© they were able to directly monitor in real time how close they were to forecast. Any special causes were discussed during the year as they occurred – as an indication of moments that they lost control of their ability to forecast.

	A	B	C	D	E	F	G
1			Forecast	Actual	week	Actual LESS Forecast	
3		dec	94.00%	94.44%	29/12/08	0.44%	
4		jan	94.00%	88.87%	05/01/09	-5.13%	
5		jan	95.00%	90.50%	12/01/09	-4.50%	
6		jan	95.00%	95.98%	19/01/09	0.98%	
7		jan	95.00%	99.42%	26/01/09	4.42%	
8		feb	95.00%	98.83%	02/02/09	3.83%	
9		feb	95.00%	98.80%	09/02/09	3.80%	
10		feb	98.00%	96.11%	16/02/09	-1.89%	
11		feb	98.00%	99.08%	23/02/09	1.08%	
12		march	99.00%	99.52%	02/03/09	0.52%	
13		march	99.00%	96.15%	09/03/09	-2.85%	
14		march	99.00%	98.09%	16/03/09	-0.91%	
15		march	99.00%	99.28%	23/03/09	0.28%	
16		april	99.00%	98.76%	05/04/09	-0.24%	
17		april	99.00%	98.02%	12/04/09	-0.98%	
18		april	99.00%	98.90%	19/04/09	-0.10%	

5. A review meeting is set-up at the end of the year. The Commissioner copies & pastes the final two columns into Baseline©:



Responding to the Red Flags, the data can be split into 4 segments, and so they take the following chart to the meeting.



Segment	Start	Finish	Mean	Sigma	Count	LCL	UCL	Stable
1	12/29/2008	02/09/2009	0.549	2.326	7	-6.43	7.526	No
2	02/16/2009	06/28/2009	-0.356	0.923	19	-3.12	2.413	Yes
3	07/05/2009	11/01/2009	-1.17	0.765	18	-3.46	1.129	Yes
4	11/08/2009	12/27/2009	0.876	0.736	8	-1.33	3.084	Yes

6. In the review meeting the chart becomes the primary focus for discussion, and they conclude that apart from a rough start during January their forecast stood up quite well, but that generally they were under-forecasting – as indicated by how close the centre-line is to zero. They decide to aim to get more realistic next year.

In particular they notice that as Christmas approached they had over-estimated the dip in performance that normally occurs. The conversation that ensues, results in them realizing that this year they hadn't been hit by any pandemic virus, and that this felt unusual. Eventually they conclude that contingency planning can improve considerably and that their forecasts for next year would allow for there being a robust emergency plan in place.

They also agree that this wholly new way of working has focused them on thinking ahead, rather than reactively arguing about events – usually a few weeks too late to do anything about them. They also decide that from now on they will improve their operational planning so that their resources match the expected demand.

The two providers each ask the commissioner to monitor them individually from now on, and agree to share their actual patient throughput times rather than suffer the loss of granularity caused by looking at the data in aggregate, and the masking that occurs because of the 4 hour arbitrary target.