

# Measuring efficiency in healthcare - NHS UK

Mojca Gros, Qubix

HROUG, Rovinj 2016



# Agenda

- General about NHS KPIs
- How can OBI help
  - OBI reports
  - Daily information via BI Publisher
- Data Quality reports
- OBI Scorecards



# Leading Innovation in Business Analytics

United Kingdom

Phone: +44 1483 480222

Email: [info@qubix.com](mailto:info@qubix.com)

United States of America

Phone: +1 703 880 6366

Email: [info@qubix.com](mailto:info@qubix.com)

Australia

Phone: +61 2 9906 4671

Email: [info@qubix.com](mailto:info@qubix.com)

Japan

Phone: +81 (0)90 7801 8933

Email: [info@qubix.com](mailto:info@qubix.com)

Slovenia

Phone: +386 1 320 76 20

Email: [info@qubix.com](mailto:info@qubix.com)

# of Business Analytics  
Projects....

200+

Hyperion • BI • Big Data

Customers Include:

- Lloyds Banking Group
- Nomura Bank
- Debenhams
- Canon
- Virgin Atlantic
- HMV
- NHS England
- Experian
- Angel Trains
- Schroders
- Mizuho Bank
- Carpetright

EMEA Team Size:

51

350+ years of experience

## Why Qubix?

**Proven.**

15+ Years Oracle Platinum  
Partner

**Trusted.**

Incredible Customer List

**Flexible.**

What's right for you?

75 people worldwide

Global Offices:

UK – Slovenia - USA – Australia - Japan

## Depth of capability...

Strategy

Optimise

Integrate

Deploy

Train

Design

Support

## Qubix Approach...

Qubix Journey Methodology

With You, Not to You

Outcome Driven

*A couple of months ago the independent Commonwealth Fund said that in the last four years the NHS has risen to become the top-ranked healthcare system across the 11 richest countries in the world - top for quality, top for efficiency, top for access, and top overall.*

*Source: <https://www.gov.uk/government/speeches/nhs-waiting-times-job-not-done> (4th August 2014)*

# NHS defined KPIs

- April 2011 - a new set of clinical quality indicators will be introduced to replace the four hour target and measure the quality of care delivered in A&E departments in England
- These indicators will support patient and public expectations of high quality A&E services and allow A&E departments to demonstrate their ambition to deliver consistently excellent services which continuously improve.

# NHS defined KPIs

- Financial indicators
- Some clinical quality indicators:
  - Left without being seen rate

The percentage of people who leave the A&E department without being seen

- Unplanned re-attendance rate

Unplanned re-attendance at A&E within 7 days of original attendance (including if referred back by another health professional)

- Time to initial assessment

Time from arrival to start of full initial assessment, which includes a brief history, pain and early warning scores (including vital signs), for all patients arriving by emergency ambulance

- Time to treatment

Time from arrival to start of definitive treatment from a decision-making clinician (someone who can define the management plan and discharge the patient)

- Total time spent in A&E

The median, 95<sup>th</sup> percentile and single longest total time spent by patients in the A&E department, for admitted and non-admitted patients

# Example of some NHS KPI's with target values

KPI	Target value
% seen and discharged within 4 Hours in MIU	95%
Number of breaches of 4 hour target	-
Total time spent in MIU less than 4 hours - 95th percentile	4 hours
Time to initial assessment for patients arriving by ambulance - 95th percentile	15 min
Time to treatment in department - median	< 60 min
Rate of onward referral from MIU	4,4%
Unplanned re-attendance rate within 7 days	< 5%
Left department without being seen	< 5%
Completion of a valid NHS number field in data sets	99%



# Why and how OBI was used

- DWH prepared from ERP data
- Data are validated, cleaned, merged and transformed
- Easy integration of **financial** and **clinical** data (Essbase and SQL Server)
- Daily loading
- User friendly reports (dynamic, pivoting, presentation...)
- Easy access to reports
- Users can make reports by themselves

# Some technical details

- Source: two ERP systems (for history data)
- Data Warehouse in MS SQL Server
- Reporting tool = Oracle Business Intelligence

# Before

MIU Scorecard July 2015.xlsx - Microsoft Excel

Target type	TARGET	2014/15	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	2015/16	2015/16 Outturn	Consequence of Breach
<b>CCQ QUALITY DOMAIN - CARING</b>																	
<i>Friendly and Family Test</i>																	
National	MIU Response Rate	Actual	19%	23.5%	29.7%	27.5%	27.1%								27.0%	27.0%	Exception report to Executive Team and remedial action plan
National	% of respondents indicating 'extremely likely' or 'likely' to recommend service	Actual	97.9%	97.5%	96.9%	96.9%	96.9%								97.0%	97.0%	
<b>CCQ QUALITY DOMAIN - RESPONSIVE</b>																	
<b>MIU - QUALITY INDICATORS</b>																	
National	% seen and discharged within 4 hours in MIU	Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	TBC
		Actual	99.62%	99.77%	99.78%	99.33%	99.79%								99.99%	99.99%	
National	Number of breaches of 4 hour target	Actual number	112	14	13	16	15								58	174	
National	Trolley waits in the MIU must not be longer than 12 hours	Target	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	<12 hrs	£1000 in respect of each breach above the threshold
		Actual	0	0	0	0	0								0	0	
National	Total time spent in MIU less than 4 hours (95th percentile)	Target	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	<4 hrs	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	1:56	0:16	2:15	2:19	0:24								0:17	2:17	
National	Time to initial assessment for patients arriving by ambulance (95th percentile)	Target	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	<15 m	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	0:11	0:13	0:11	0:13	0:13								0:12	0:10	
National	All handovers between ambulance and MIU must take place within 15 minutes with none waiting more than 30 minutes	Target	0	0	0	0	0	0	0	0	0	0	0	0	0	0	£200 in respect of each breach above the threshold
		Actual	0	0	0	0	0								0	0	
National	All handovers between ambulance and MIU must take place within 15 minutes with none waiting more than 60 minutes	Target	0	0	0	0	0	0	0	0	0	0	0	0	0	0	£1000 in respect of each breach above the threshold
		Actual	0	0	0	0	0								0	0	
National	Time to treatment in department (median)	Target	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	<60 m	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	3:25	0:27	3:29	0:32	0:28								0:28	3:26	
OCS	Rate of onward referral from MIU	Target	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	3.9%	4.6%	5.3%	5.8%	5.0%								5.2%	5.2%	
<b>MIU - PATIENT IMPACT QUALITY INDICATORS</b>																	
National	Unplanned re-attendance rate within 7 days	Target	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	5.4%	0.6%	5.8%	5.8%	5.0%								5.9%	5.0%	
National	Left department without being seen	Target	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	Any Month + Exception report, 2nd Consecutive Month + remedial action
		Actual	0.3%	1.1%	1.3%	0.3%	0.9%								1.0%	1.0%	
<b>Data Quality - Submitted to Secondary Uses Service (SUS)</b>																	
National	Completion of a valid NHS number field in data sets	Target	99.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	£10 per breach above the

- more than one Excel file
- separate sheet for each Cost Centre (Hospital)
- manually data refresh
- for detailed data they need to order new report

# Now

## Alerts

- Yesterday's 4-Hour Breaches
- Cost Centre Name validation

Normal 25/01/2016 14:32:58 View | Clear | More ▾  
 Normal 25/01/2016 09:00:01 View | Clear | More ▾



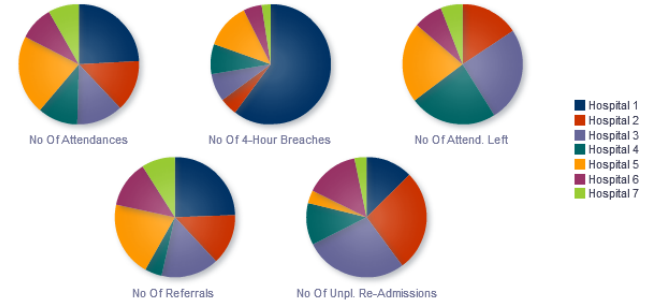
- Financial Year  FY2014/15  FY2015/16
- Period  April  May  June  July  August  September  October  November  December  January  February  March
- Cost Centre  (All Column Values)  Hospital 1  Hospital 2  Hospital 3  Hospital 4  Hospital 5  Hospital 6  Hospital 7

Click on the numbers to see detailed data

Select View Relative Values ▾

FY2015/16						
Cost Centre Name	Number Of Attendances	Number Of 4+Hour Breaches	Number Of Attendances Left	Number Of Referrals	Number Of Unplanned Re-Admissions	Number Of Unexplained Breaches
Hospital 1	1,422	320	0	79	39	306
Hospital 2	810	25	8	44	85	0
Hospital 3	734	40	13	50	86	0
Hospital 4	634	43	12	15	35	0
Hospital 5	1,253	65	11	65	11	65
Hospital 6	544	26	4	41	45	0
Hospital 7	484	13	3	29	10	7
<b>Grand Total</b>	<b>5,881</b>	<b>532</b>	<b>51</b>	<b>323</b>	<b>311</b>	<b>378</b>

Select View Pie Chart (relative values) ▾



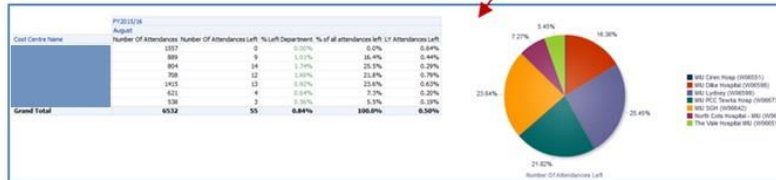
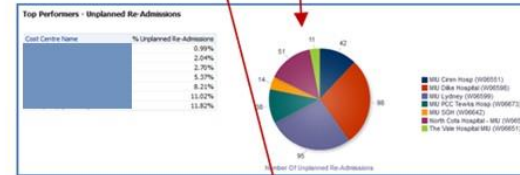
# Drill to details

Select View Relative Values ▾

Cost Centre Name	Number Of Attendances	Number Of 4-Hour Breaches	Number Of Attendances Left	Number Of Referrals	Number Of Unplanned Re-Admissions	Number Of Unexplained Breaches
Walsley Health Centre (W06652)	1,557	9	0	90	42	0
Walsley Health Centre (W06652)	889	0	9	47	98	0
Walsley Health Centre (W06652)	804	0	14	53	95	0
Walsley Health Centre (W06652)	708	1	12	16	38	0
Walsley Health Centre (W06652)	1,415	0	13	74	14	0
Walsley Health Centre (W06652)	621	0	4	46	51	0
The Vale Hospital MBU (W06651)	538	0	3	33	11	0
<b>Grand Total</b>	<b>6,532</b>	<b>10</b>	<b>55</b>	<b>359</b>	<b>349</b>	<b>0</b>

Cost Centre Name	Service Description	Breach Reason 1	Breach Reason 2	Number Of 4-Hour Breaches
Walsley Health Centre (W06652)	Minor Injuries Unit	Other		3
		Undergoing treatment		1
		Waiting for community hospital bed		1
		Waiting for transport		4
<b>Grand Total</b>				<b>9</b>

[Return - Create Bookmark Link](#)



Cost Centre Name	Departure Destination	Service Description	Number Of Referrals	Number Of Referrals Referred for a Ref to other provider	Minor Injuries Unit
Walsley Health Centre (W06652)	Referred for a Ref to other provider	Minor Injuries Unit	82	8	8.9%
<b>Grand Total</b>			<b>90</b>	<b>100.0%</b>	

[Return - Create Bookmark Link](#)

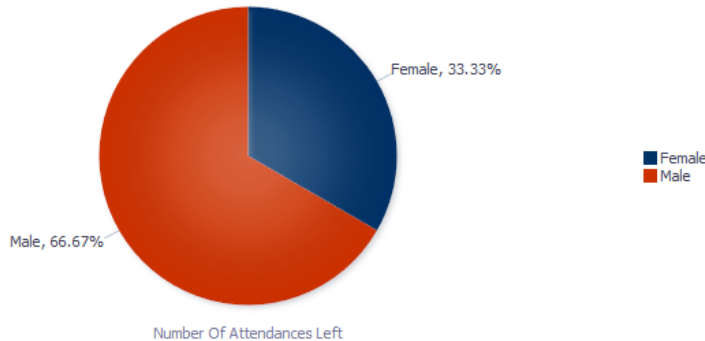
# KPI: Left without being seen

Click on the numbers to see detailed data

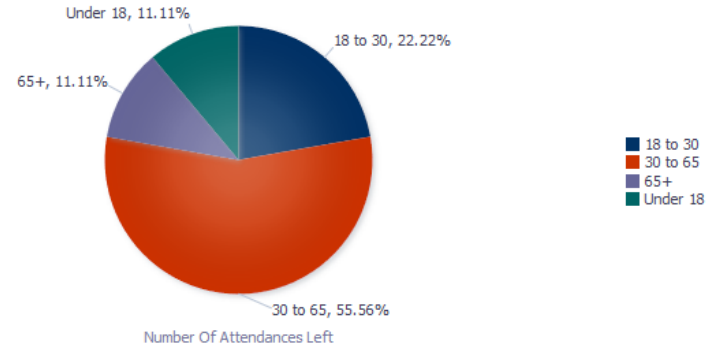
Select View Relative Values

FY2016/17						
Cost Centre Name	Number Of Attendances	Number Of 4-Hour Breaches	Number Of Attendances Left	Number Of Referrals	Number Of Unplanned Re-Admissions	Number Of Unexplained Breaches
[Redacted]	1,346	17	0	92	21	0

By Gender

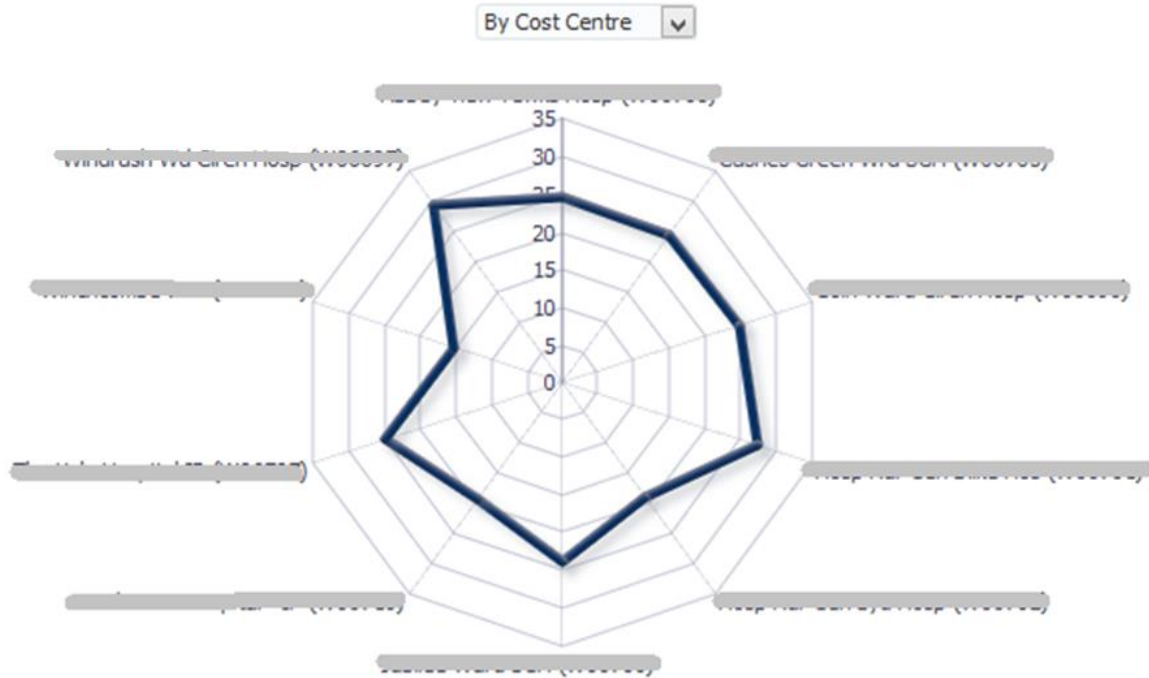


By Age Band



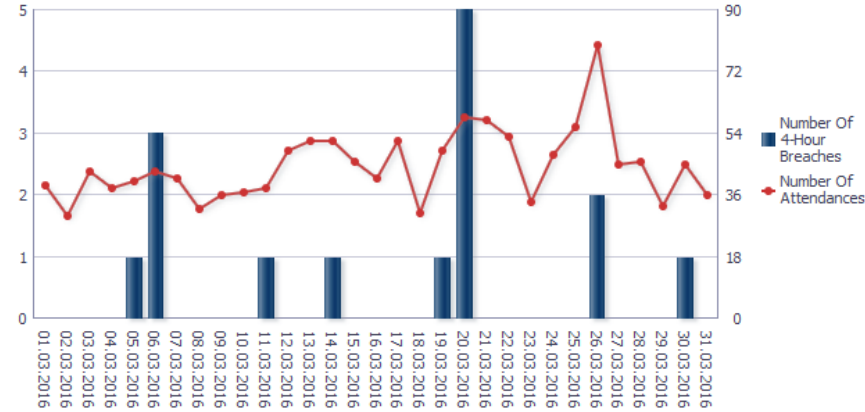
# KPI: Average Length of Stay

Average Length of Stay



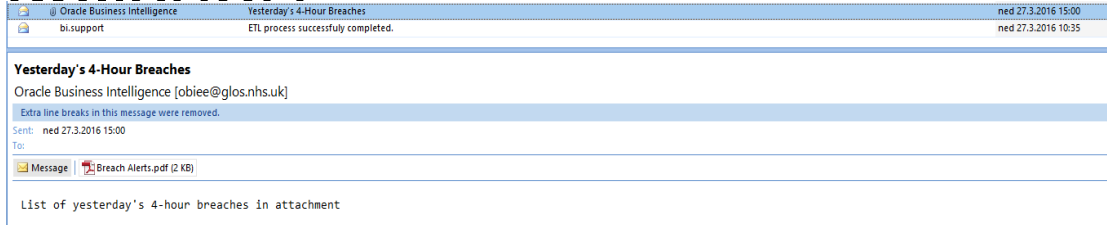
# KPI: 4 hour breaches

Arrival Date	Arrival Day Name	Number Of Attendances	Number Of 4-Hour Breaches	01.03.2016 - 05.03.2016		06.03.2016 - 10.03.2016		11.03.2016 - 15.03.2016		16.03.2016 - 20.03.2016	
				Number Of Attendances	Number Of 4-Hour Breaches	Number Of Attendances	Number Of 4-Hour Breaches	Number Of Attendances	Number Of 4-Hour Breaches	Number Of Attendances	Number Of 4-Hour Breaches
01.03.2016	Tuesday	183	0	39	0	27	0	28	0	22	0
02.03.2016	Wednesday	138	0	30	0	17	0	19	0	12	0
03.03.2016	Thursday	170	1	43	0	22	0	19	0	18	0
04.03.2016	Friday	147	0	38	0	22	0	9	0	13	0
05.03.2016	Saturday	198	1	40	1	23	0	27	0	14	0
06.03.2016	Sunday	201	3	43	3	39	0	24	0	19	0
07.03.2016	Monday	194	0	41	0	32	0	29	0	16	0
08.03.2016	Tuesday	150	0	32	0	19	0	19	0	22	0
09.03.2016	Wednesday	153	0	36	0	27	0	25	0	6	0
10.03.2016	Thursday	144	0	37	0	22	0	18	0	14	0
11.03.2016	Friday	174	1	38	1	21	0	21	0	20	0
12.03.2016	Saturday	209	0	49	0	26	0	17	0	30	0
13.03.2016	Sunday	232	0	52	0	24	0	20	0	25	0
14.03.2016	Monday	233	2	52	1	31	0	20	0	16	0
15.03.2016	Tuesday	183	0	46	0	22	0	22	0	22	0
16.03.2016	Wednesday	181	0	41	0	22	0	22	0	22	0
17.03.2016	Thursday	208	1	52	0	37	1	22	0	22	0
18.03.2016	Friday	158	0	31	0	28	0	28	0	22	0
19.03.2016	Saturday	219	1	49	1	33	0	33	0	22	0
20.03.2016	Sunday	240	6	59	6	34	0	34	0	22	0
21.03.2016	Monday	210	0	58	0	26	0	26	0	22	0
22.03.2016	Tuesday	180	0	53	0	23	0	23	0	22	0
23.03.2016	Wednesday	176	0	34	0	29	0	29	0	22	0
24.03.2016	Thursday	189	0	48	0	23	0	23	0	22	0
25.03.2016	Friday	258	0	56	0	35	0	35	0	22	0
26.03.2016	Saturday	289	2	80	2	32	0	32	0	22	0
27.03.2016	Sunday	196	0	45	0	25	0	25	0	22	0
28.03.2016	Monday	227	0	46	0	34	0	34	0	22	0
29.03.2016	Tuesday	163	0	33	0	25	0	25	0	22	0
30.03.2016	Wednesday	163	1	45	1	24	0	24	0	22	0
31.03.2016	Thursday	173	0	36	0	33	0	33	0	22	0
<b>Grand Total</b>		<b>5939</b>	<b>19</b>	<b>1382</b>	<b>16</b>	<b>837</b>	<b>1</b>				





# Alerts – send via email (OBI Agents, BI Publisher)

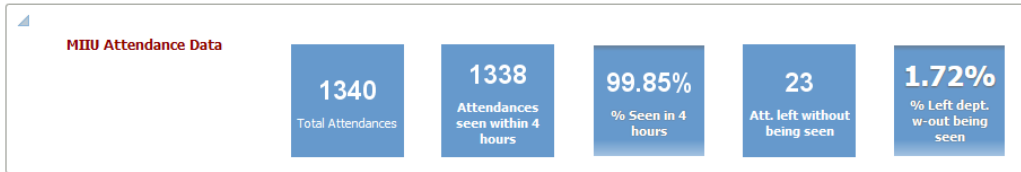


- information sent to the responsible person when certain event happens

**Breach Alerts**  
 Yesterday's 4-hour breaches

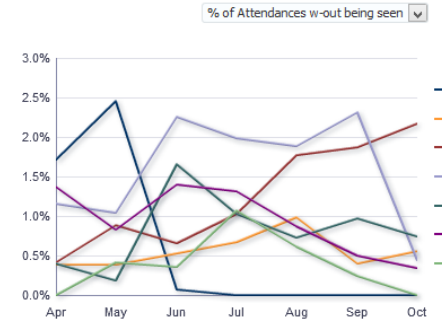
Arrival Date	Cost Centre Name	Attendance Number	NHS Number	Time To Assessment	Time To Be Seen	Time To Departure	Breach Reason 1	Breach Reason 2
26.03.2016				0:02	0:11	4:22	Waiting for transport	
				0:18	0:21	4:42	Computer downtime	

# Integration of financial and clinical data



Period: M2 May | Data By Cost Centre

Cost Centre	Attendances per Day	Attendances per Operating Hour	Marginal Costs per Attendances	Marginal Costs per Operating Hour	Attendances per WTE	Attendances per WTE per day	Marginal Costs per WTE	Marginal Costs per WTE per day
[Redacted]	47.2	3.9	£47.45	£186	79.6	2.6	£3,779	£122
[Redacted]	25.3	2.1	£44.20	£93	98.0	3.2	£4,332	£140
[Redacted]	21.8	1.8	£32.93	£60	111.7	3.6	£3,679	£119
[Redacted]	18.5	1.5	£45.13	£69	79.3	2.6	£3,580	£115
[Redacted]	17.5	1.5	£50.81	£74	70.4	2.3	£3,579	£115
[Redacted]	43.1	3.6	£29.79	£107	118.5	3.8	£3,531	£114
[Redacted]	15.7	1.3	£61.30	£80	79.9	2.6	£4,900	£158



# Data Quality

- For correctness of KPIs the data quality is utmost important
- Regular data checking
- Business rules implemented in ETL (e.g. rejected data)
- Data Quality Dashboard:
  - Daily checkings
  - From technical and business view
- Alerts

# Data Quality

- Checks inside of ETL

**SQL Server Job System: 'NHS BI Reporting - MAIN ETL process' completed on \\GCSSRV031**

bi.support [obiee@glos.nhs.uk]

Extra line breaks in this message were removed.

Sent: pet 22.4.2016 15:35

To:

JOB RUN: 'NHS BI Reporting - MAIN ETL process' was run on 22/04/2016 at 14:31:41  
 DURATION: 0 hours, 3 minutes, 19 seconds  
 STATUS: Failed  
 MESSAGE: The job failed. The job was launched by User: GLOS. The last step to complete step 5

**(MIU) SSIS Package Populate Dimensions Historical Failed on GCSSRV031. Sent time 22 Apr 2016 14:36:04:197**

bi.support [obiee@glos.nhs.uk]

Extra line breaks in this message were removed.

Sent: pet 22.4.2016 15:36

To: Ben.Lee@glos-care.nhs.uk; Steve.Wood@glos-care.nhs.uk

Cc: Mojca.Gros@qubix.com; aleks.abramovic@qubix.com

SQL Instance: GCSSRV031

Package Name: Populate Dimensions Historical Job Originating Host: GCSSRV031 Run As: GLOS\sql\_GCSSRV031 Start DT: 2016-04-22 14:33:41.000 End DT: 2016-04-22 14:35:00.000 Error Message:

Beginning of package execution.

SSIS Error Code DTS\_E\_OLEDBERROR. An OLE DB error has occurred. Error code: 0x80040E2F.

An OLE DB record is available. Source: "Microsoft SQL Server Native Client 10.0" Hresult: 0x80040E2F Description: "The statement has been terminated."

An OLE DB record is available. Source: "Microsoft SQL Server Native Client 10.0" Hresult: 0x80040E2F Description: "Cannot insert duplicate key row in object 'FOUNDATION.TreatmentFunction\_Dim' with unique index 'UX\_TreatmentFunction\_Dim\_TreatmentFunction\_Code'. The duplicate key value is (303)."

# Business rules – rejected data

## Rejected data from SUS

Select Reject Date to see the latest data

RejectDate 06/03/2016 ▾

Arrival\_Year 2015 ▾

AEAttendanceNumber	RejectReason	ArrivalDateTime	InitialAssessmentDateTime	SeenDateTime	DepatureDateTime
	The seen date is earlier than the initial assessment date or arrival date	10/01/2015 22:02:00	11/01/2015 22:21:00	10/01/2015 22:40:00	10/01/2015 22:40:00
	The departure date is earlier than the seen date or arrival date	19/02/2015 19:09:00	19/02/2015 19:23:00	20/02/2015 10:09:00	20/02/2015 00:55:00
	The seen date is earlier than the initial assessment date or arrival date	05/03/2015 21:20:00	06/03/2015 21:38:00	05/03/2015 21:56:00	05/03/2015 22:20:00
	The initial assessment date is earlier than the arrival date	22/05/2015 23:33:00	22/05/2015 16:18:00	22/05/2015 09:02:00	23/05/2015 00:15:00
	The initial assessment date is earlier than the arrival date	23/05/2015 23:54:00	23/05/2015 16:30:00	23/05/2015 09:06:00	24/05/2015 00:12:00
	The initial assessment date is earlier than the arrival date	24/05/2015 23:43:00	24/05/2015 16:32:00	24/05/2015 09:20:00	25/05/2015 00:35:00
	The initial assessment date is earlier than the arrival date	17/06/2015 23:51:00	17/06/2015 16:32:00	17/06/2015 09:12:00	18/06/2015 00:23:00
	The initial assessment date is earlier than the arrival date	01/07/2015 23:20:00	01/07/2015 16:18:00	01/07/2015 09:16:00	02/07/2015 00:15:00
	The initial assessment date is earlier than the arrival date	04/07/2015 23:02:00	04/07/2015 15:54:00	04/07/2015 08:46:00	05/07/2015 00:10:00

# Data Quality Dashboard

Click on number to see the detailed list of attendances / patients



## % of Attendances with NHS Number

Arrival Fiscal Year

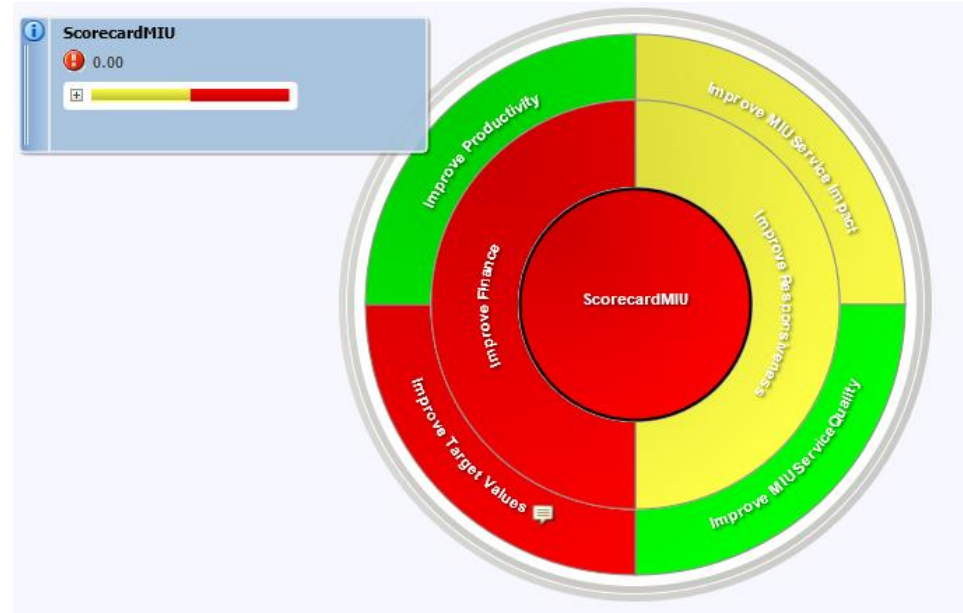
Cost Centre Name	% of attendances with NHS Number											
	April	May	June	July	August	September	October	November	December	January	February	March
[Redacted]	98.67%	98.35%	97.31%	97.67%	96.88%	98.29%						
[Redacted]	99.65%	99.54%	98.57%	98.68%	98.88%	99.39%						
[Redacted]	98.50%	98.80%	98.58%	97.92%	98.76%	100.00%						
[Redacted]	99.12%	99.20%	98.96%	99.04%	97.74%	98.98%	96.61%					
[Redacted]	99.25%	98.99%	99.28%	98.23%	98.80%	100.00%						
[Redacted]	96.54%	94.82%	96.70%	94.97%	95.49%	97.14%	97.40%					
[Redacted]	99.09%	99.08%	99.04%	99.52%	98.89%	100.00%						
<b>Grand Total</b>	<b>98.81%</b>	<b>98.52%</b>	<b>98.33%</b>	<b>97.95%</b>	<b>97.93%</b>	<b>98.56%</b>	<b>96.71%</b>					

# Data testing

- Plan enough time for testing
- Testing – in every phase of system development
- Testing of BI systems should be performed by key business users
- Test environment should be very similar to production env.
- Data checking and immediate obveščanje should be part of daily load

# OBI Scorecards

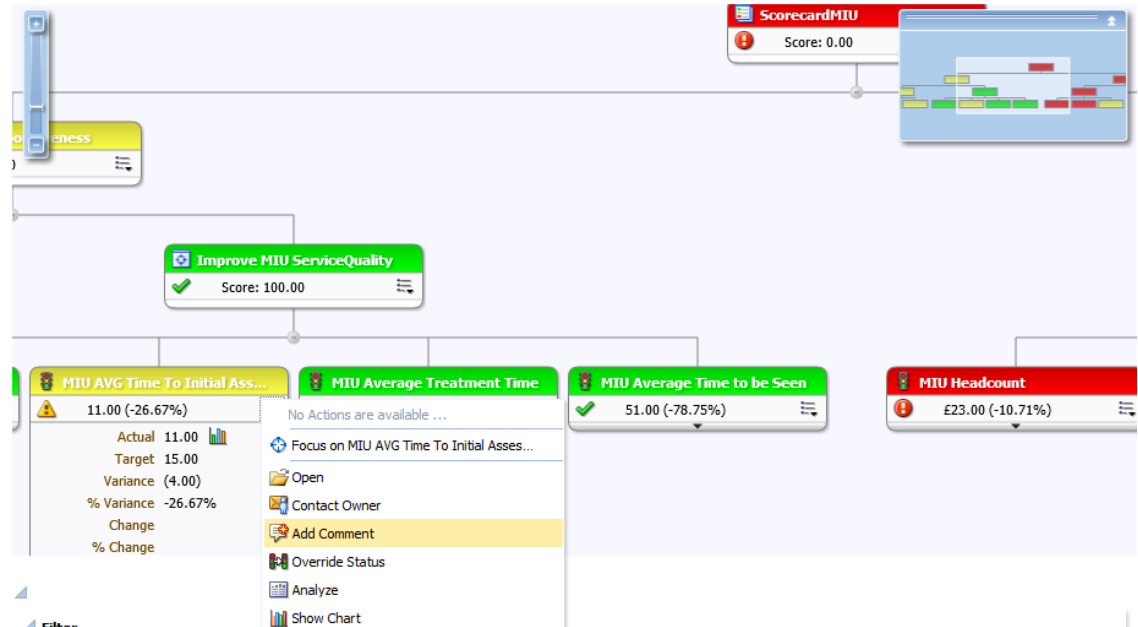
- Align business activities to the vision strategy of the organization
- Easy to use
- Easy to understand
- Grafical interface to monitor and react immediately
- When KPI's and targets are set – fast implementation





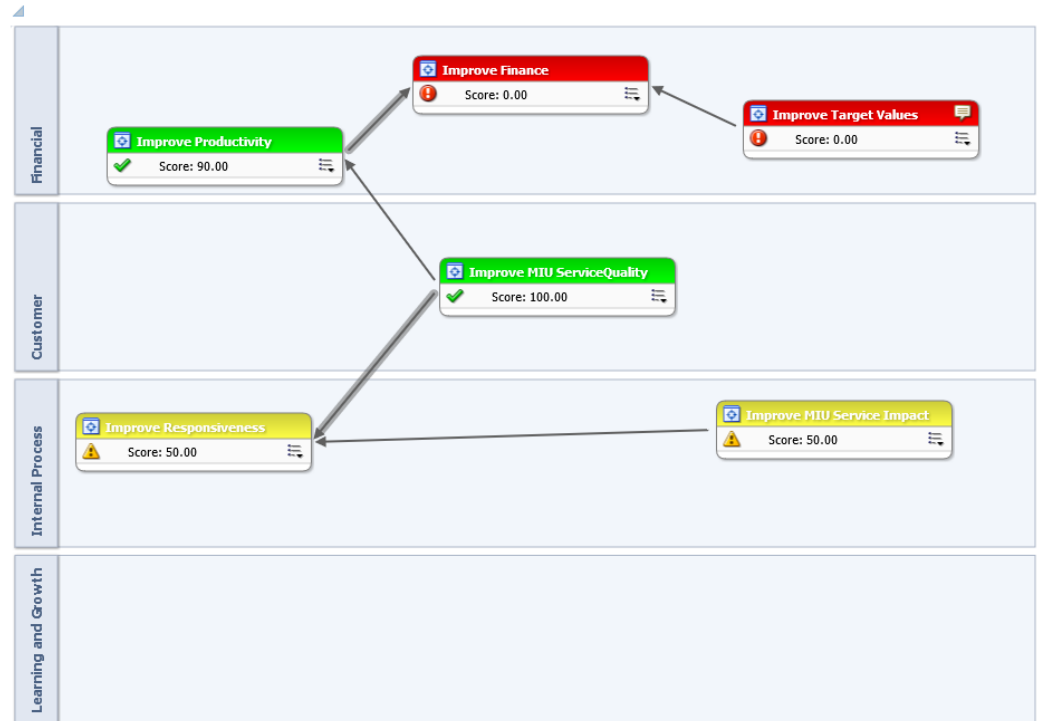
# OBI Scorecards

- Interactive: comments, status override, analyze...



# OBI Scorecard

- view KPIs from different perspectives, e.g.:
  - Financial
  - Customer
  - Internal Process
  - Learning and Growth



# Further Development

- add other business areas and KPIs
- Scorecards: POC -> implement in production
- BICS ?

# Key takeaways

- Key business objectives must be well defined
- Target values must be defined
- With easy access to data you can act immediately
- You can analyze the data (search for abnormal behavior, patterns...)
- You can analyze historical data, do trendings, comparison with prior values...
- Implement solution step by step (e.g. by business areas)

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