BAE SYSTEMS

BAE Systems (Rochester) – supplier development programme

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Introduction

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The Rochester business

- Part of the Platform Solutions business sector within BAE SYSTEMS
- Engineering and manufacturing site with a mix of technology demonstrator, product development and manufacturing programmes.
  - Producing wide range flight safety and mission critical products
- World leader in,
  - Aircraft flight controls: active inceptor systems, fly by wire flight controls & flight control computing.
  - Displays: head up, head down & helmet mounted
- Platforms:
  - Military (fixed wing), Eurofighter (Typhoon), C17, F22, Gripen, Joint strike fighter,
  - Military (Rotary wing), UH-60 (Black Hawk), CH-53 (Sea Stallion), Eurocopter Tiger
  - Commercial aircraft: Boeing, Airbus, Embraer.

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Supplier development journey

- Pre 2006 traditional Supplier quality approach
  - Audit and action
- Poor performance on a major manufacturing program led to the supplier development initiative.
  - Identified the need for a different approach with three problem suppliers
  - Self funded risk mitigation activity on the subsequent program phase

- The approach was continuous improvement not audit focused
  - Established a team of three manufacturing process engineers embedded in procurement
  - Site Directors provided senior level sponsorship and support
  - The team's focus was long term, sustainable quality and delivery benefits through manufacturing process improvements at the suppliers facility

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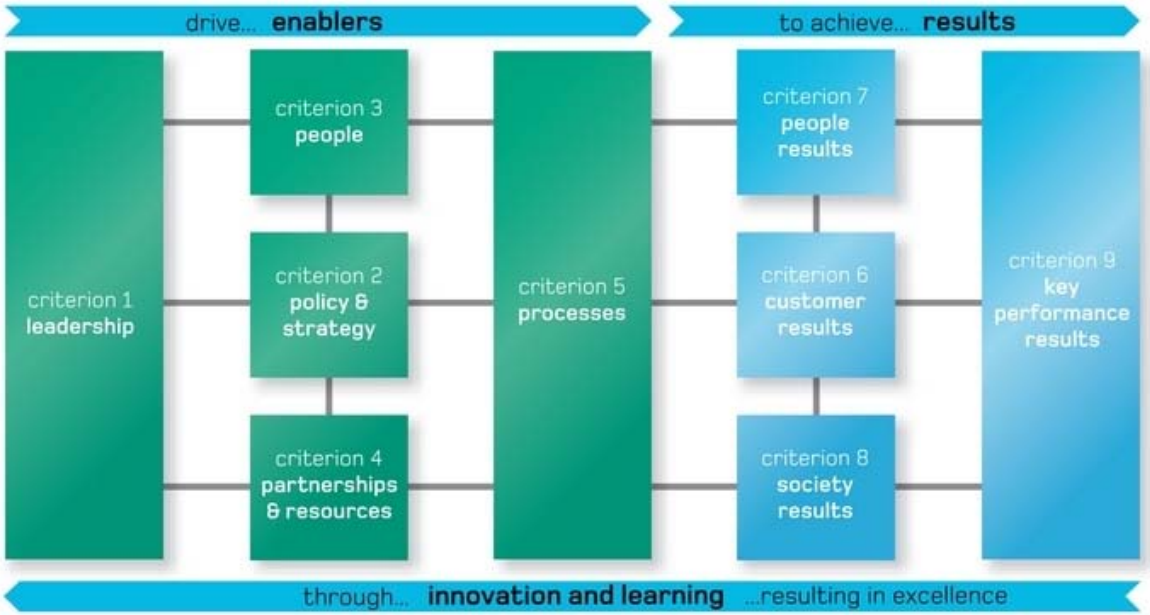
Supplier development journey

- Initial six month period
  - Degree of reluctance and suspicion from suppliers
  - As benefits became apparent the approach became more collaborative to the point where the suppliers started to pull on our expertise.
- Six to twenty four months
  - Process improvements were embedded and quality and on-time delivery improvements started to be seen
  - Secondary benefit was the growth in our product technical knowledge to assist and enhance our sub-contract management capability
- Twelve to eighteen months
  - Started to roll out across other programs and suppliers

The supplier development programme

- **The development programme has been developed from established lean manufacturing principles and continuous improvement models**
  - The lean manufacturing principles used were initially developed within the automotive industry.
  - The European foundation of quality management (EFQM) continuous improvement model is used to provide an improvement framework



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The supplier development programme

As an initial approach the supplier development team work with the supplier to agree Performance metrics.

- The two measures of performance used within our development programme are:

$$\text{Quality} = \frac{\text{Number of rejects}}{\text{Number of deliveries}} \quad \text{(Expressed as \%)}$$

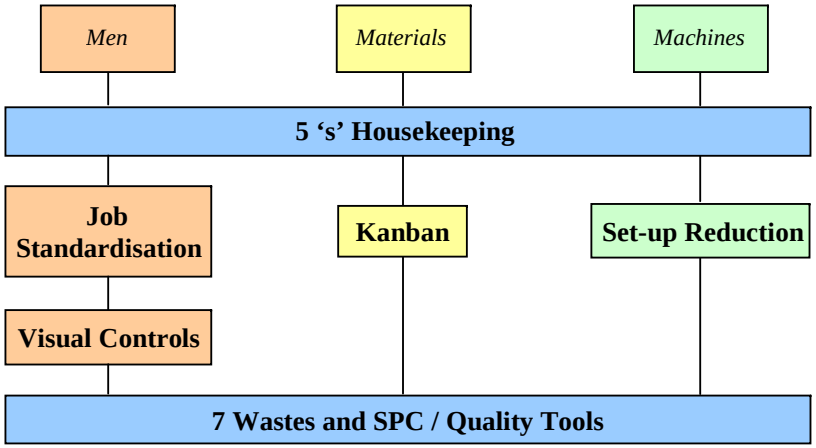
$$\text{Ontime Delivery} = \frac{\text{Number of 'Ontime' deliveries}}{\text{Number of scheduled deliveries}} \quad \text{(Expressed as \%)}$$

The supplier development programme

After agreeing performance metrics the supplier development team work with the supplier to evaluate their process controls and establish a level of lean maturity

- This is achieved by conducting a joint assessment
- The assessment is then used to highlight development activities

A framework for Manufacturing Excellence



…….. *supported by design related improveme methodologies (**VE/VA** or **QFD**).*

Development toolset

The initial assessment is conducted against defined scoring criteria in the areas below.

Visual Control Improvement Activities Board ■Topical activity board. Frequent review process. SMART objectives. Appropriate targets displayed. ■ No cell/dept activity board in use.	***Visual Control*** Skills matrices ■ Employees trained in three or more competencies. Skills matrix displayed. Supported by training programme. Competencies actively used. ■ Employees trained to a recognised standard in one competence.	***Visual Control*** Production Control Board ■ Planned v actual production plan displayed. Appropriate planning period used e.g. hourly, daily, etc. Variances and corrective actions used. ■ No visual indication of production plan.	***Visual Control*** Quality/Defects ■ Target and actual quality levels are displayed and topical. Cost of quality displayed. Analysis and corrective actions displayed and topical ■ No monitoring of Cost of Quality and / or scrap levels.	***Visual Control*** Inventory ■ Cell/dept. target and actual displayed. Targets from Business Plan. Team understanding. Clear & concise controls. Subject to review. ■ Excess inventory observed.
Visual Control Man-hour Reduction ■ Cell/department topical plan displayed. Target v actual shown. Ownership of plan is clear. SMART objectives. Subject to review. ■ No man hour reduction plan.	***7 Wastes*** Processing ■ Correct use of feeds and speeds, number of cuts, etc. Close to Form material used as appropriate. Suitable method of manufacture. Standard job in use. ■ Processing waste observed e.g air cutting, oversize material, excessive dwell time, etc.	***7 Wastes*** Movement ■ Employees working effectively. Best practice workplace ergonomics. Minimum movement "off"or"around" the job. Rules of movement economy understood & in use. ■ Excessive time spent looking for tools, collecting materials, etc.	***7 Wastes*** Waiting Time ■ Minimum waiting time observed e.g. waiting for NC equipment to stop, waiting for materials, etc. Multi-equipment manning. Use of 'Andon'. ■ Waiting time frequently observed.	***7 Wastes*** Overproduction ■ Component quantities in accordance with customer requirements. Planned inventory. Customer/Supplier interface. ■ Product manufactured to cover for scrap, anticipated demand, etc.
7 Wastes Quality/Defects ■ Prevention based detection employed on key processes e.g. in-process checks, probing cycles. Operator self inspection employed for all jobs. ■ Downstream capture of quality issues e.g. final inspection.	***7 Wastes*** Inventory ■ Components manufactured in appropriate batch sizes - ABC categorisation. Minimum/planned inventory. Minimum batch sizes from Suppliers. ■ Large/variable batch sizes. No supporting methodology.	***7 Wastes*** Transportation ■ Minimum distance required to transport product, tooling, materials, etc. Appropriate transportation media used. Appropriate close coupling. ■ Excessive movement and handling required.	***5S Workplace Organisation*** Environment ■ Show room type environment. Pathways and areas clearly marked. First line operator maintenance. ■ Untidy - room for improvement.	***5S Workplace Organisation*** Address and Place ■ Materials, parts, tools, etc, clearly marked and held in appropriate locations. Good workplace ergonomics and storage media. ■ Locations not obvious. Cluttered storage.
Set-Up Reduction ■ Key processes/bottlenecks targeted for SUR activity. Target and actual displayed. Good workplace ergonomics. ■ No/anecdotal evidence of SUR activity.	***Standardised Job*** ■ Method and time documented at appropriate level of detail. Standard job adhered to. (Insignificant deviation in method/time) Job subject to frequent review. ■ Significant variations from standard job No review cycle. Insufficient detail	***7 Quality Tools*** ■ 3 or more tools in active use. Information used to enable improvements. Team trained in all Tools. Evidence of improvements. ■ No/anecdotal evidence of the Quality Tools.	***7 Quality Tools*** Process Control ■ Valid application procedures exist problem solving techniques used, CPK of 1.66 being achieved, Management/operators trained, action taken on Out of control conditions. ■ No use of SPC within the cell.	***Kanban*** ■ Supply and demand synchronised. Mechanism applied to all suitable areas. Lower tier supplier involvement. Non-product applications. ■ Kanban mechanisms not in use.

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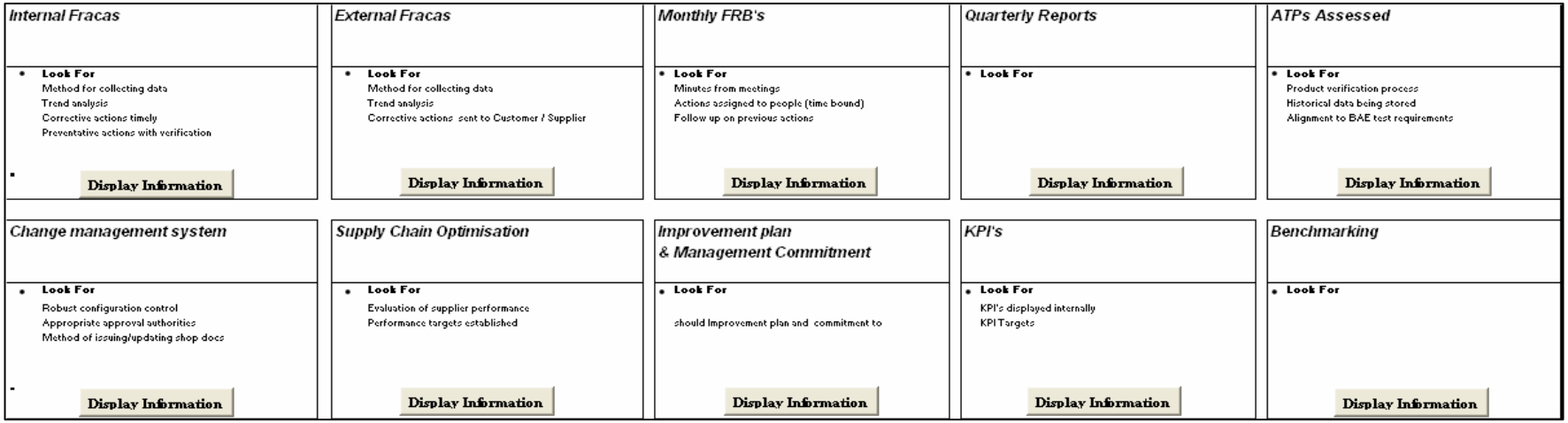
Assessment example

Within the toolset scoring criteria are clearly defined

Visual Control Improvement Activities Board	
How the organisation ensures visibility of improvement initiatives.	
Expectations	
4.	Topical activity board, displaying what improvement activities are actually taking place. Activities are time bound with responsibilities indicated. Frequent review process in place to ensure topicality (daily, weekly meetings centred around the improvement board). Targets are shown where appropriate, e.g.. quality, delivery with SMART objectives.
3.	Topical activity board, displaying what improvement activities are actually taking place. Activities are time bound with responsibilities indicated. Team understanding. Targets are not shown.
2.	Improvement plans / activities displayed but lack sufficient detail to effectively progress issues. Team understanding. Board is not topical.
1.	Information displayed is of a general nature, e.g.. process improvement tools, health & safety, etc.
0.	No cell / department activity board in use.

Contractual requirements

As well as working with the supplier on lean activities the team also help to ensure the supplier is contractually compliant with our customers requirements



These extra areas are assessed in addition to the lean assessment

Supplier development scorecard

From the initial assessment a development scorecard is completed. This scorecard is used to:

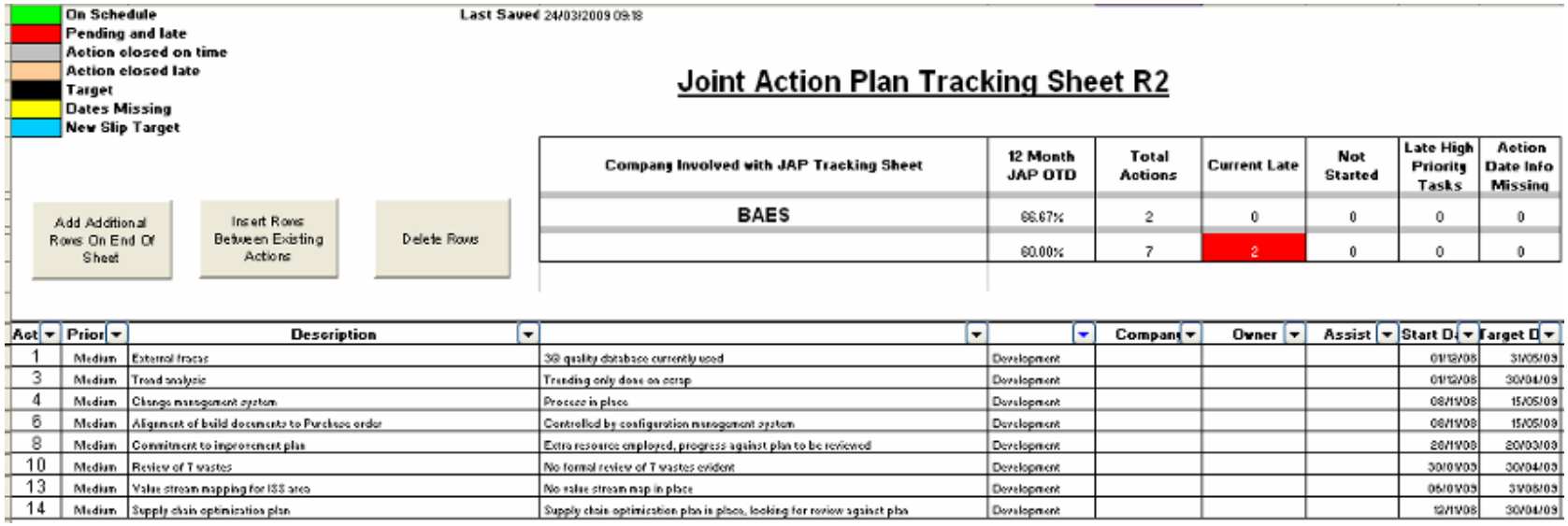
1) Highlight areas for improvement.

2) Give a point to gauge improvements against

3) Provide a maturity score

Development of a joint action plan

After the initial assessment an action plan is developed to improve the initial score.



On Schedule
Pending and late
Action closed on time
Action closed late
Target
Dates Missing
New Slip Target

Last Saved 24/03/2009 09:18

Joint Action Plan Tracking Sheet R2

Add Additional Rows On End Of Sheet | Insert Rows Between Existing Actions | Delete Rows

Company Involved with JAP Tracking Sheet	12 Month JAP OTD	Total Actions	Current Late	Not Started	Late High Priority Tasks	Action Date Info Missing
BAES	66.67%	2	0	0	0	0
	60.00%	7	2	0	0	0

Act	Prior	Description			Compan	Owner	Assist	Start D	Target D
1	Medium	External fracas	3@ quality database currently used	Development				01/12/08	31/05/09
3	Medium	Trend analysis	Trending only done on corsp	Development				01/12/08	30/04/09
4	Medium	Change management system	Process in place	Development				08/11/08	15/05/09
6	Medium	Alignment of build documents to Purchase order	Controlled by configuration management system	Development				08/11/08	15/05/09
8	Medium	Commitment to improvement plan	Extra resource employed, progress against plan to be reviewed	Development				28/11/08	20/03/09
10	Medium	Review of T wastes	No formal review of T wastes evident	Development				30/01/09	30/04/09
13	Medium	Value stream mapping for I33 area	No value stream map in place	Development				06/01/09	31/05/09
14	Medium	Supply chain optimisation plan	Supply chain optimisation plan in place, looking for review against plan	Development				12/11/08	30/04/09

The supplier development team work closely with the supplier to complete actions on the plan.

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Examples of development activities

5'S Training and Workshops

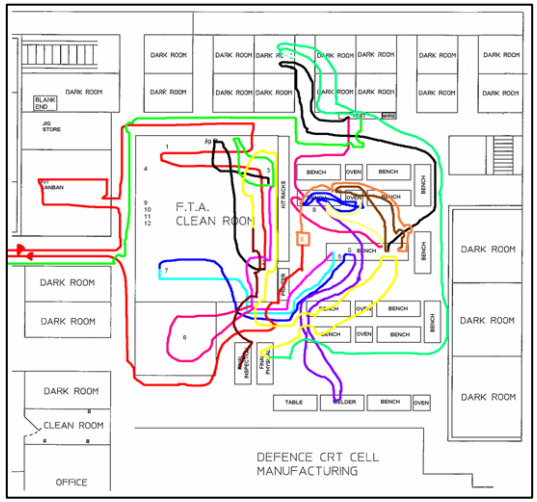
Before

After

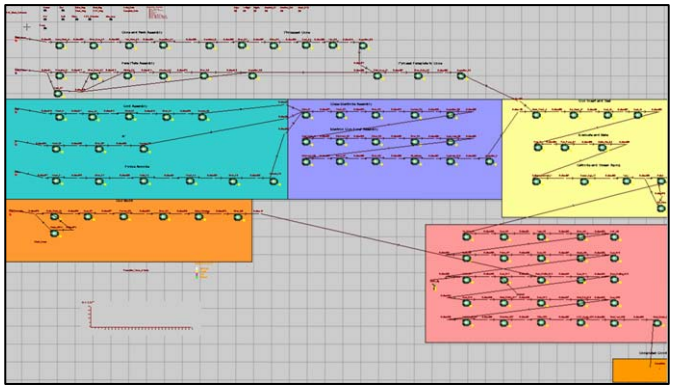
Examples of development activities

Production work flow analysis

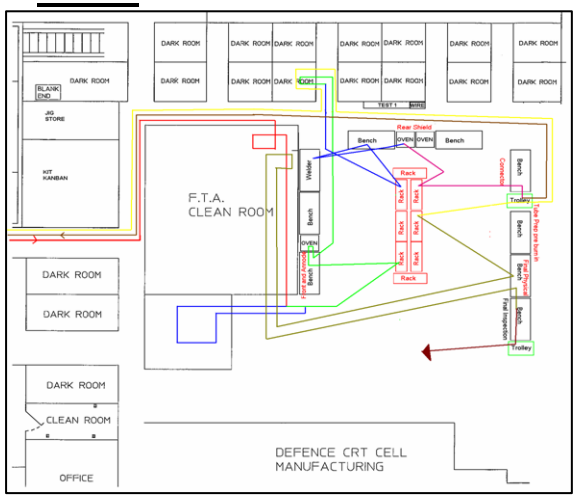
Before



Simulation



After



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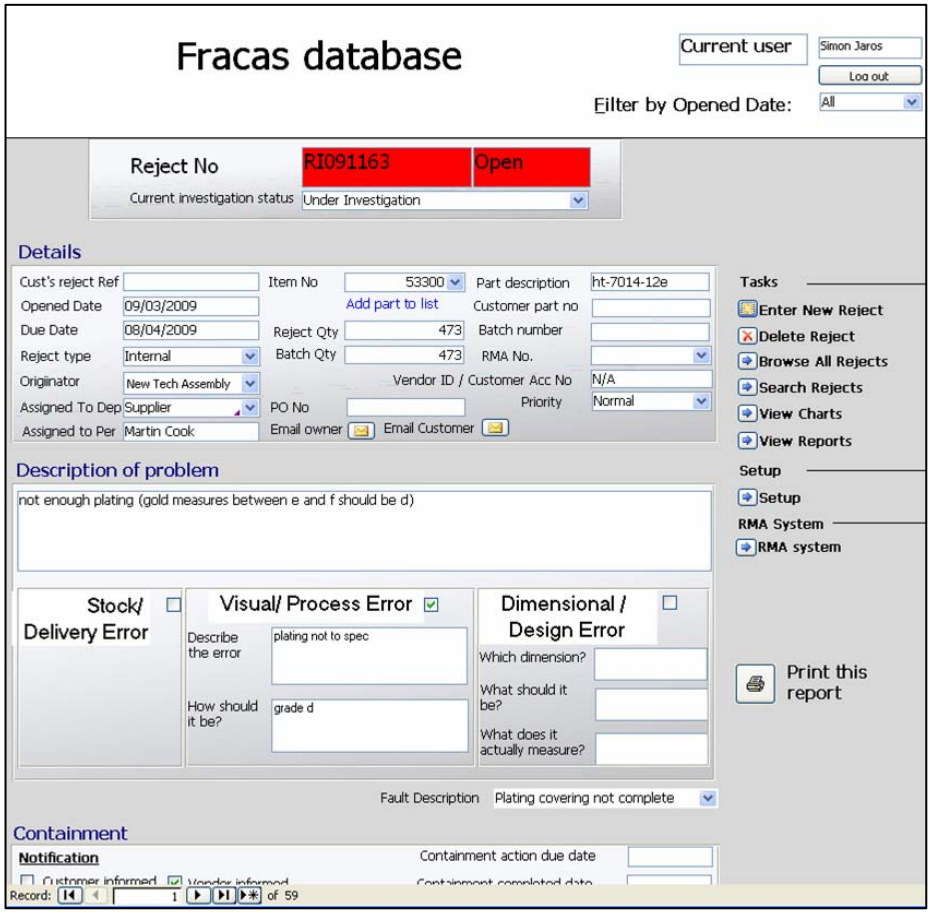
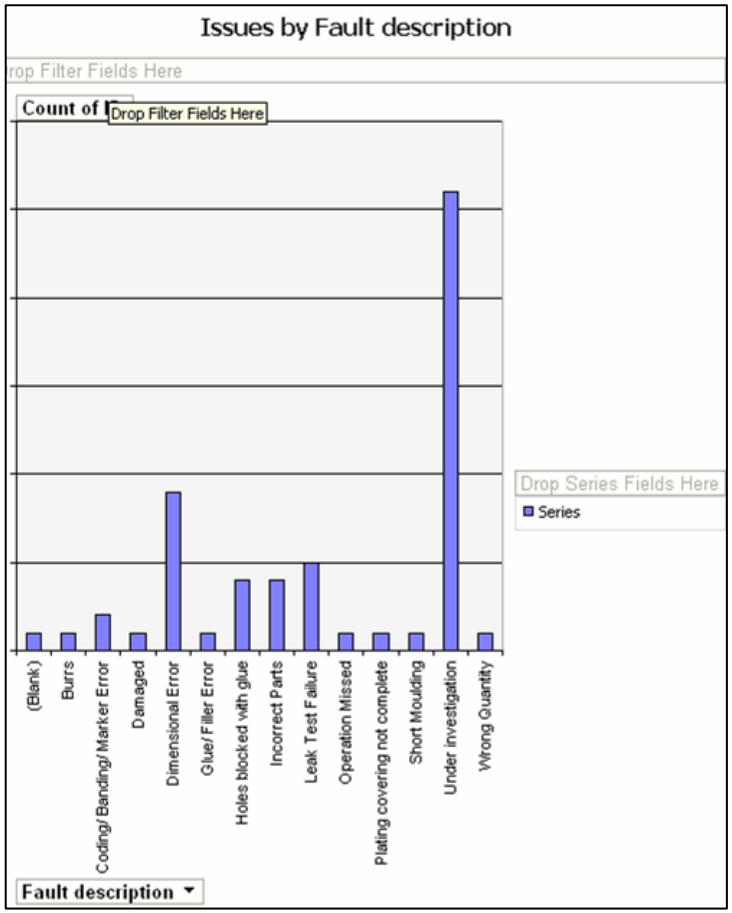
Examples of development activities

Development of FRACA systems





Measured improvements

Balanced scorecard

BAE Systems Electronics and Integrated Solutions
Platform Solutions - Rochester (UK)

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STRATEGIC SUPPLIER MANAGEMENT
BALANCED SCORECARD

Vendor:	
Month:	
Account Mgr:	

SUMMARISED SCORE:	90
MIN TARGET:	90
VARIANCE TO MIN TARGET:	0

PROCESS AND KPIs
(Monthlu Update)

	ACTUAL	TARGET
PROCESS IMPROVEMENT	94.07%	85.00%
ON TIME DELIVERY	100.00%	95.00%
QUALITY	95.50%	98.00%
ROLLED UP AVERAGE	96.52%	92.67%
WEIGHTED SCORE	35	40 pts

PROJECT MGT
(Quarterly Update)

	ACTUAL	TARGET
PROGRAM/RISK MGT SUPPORT	4	5
TECHNICAL SUPPORT	4	5
COMMERCIAL SUPPORT	4	5
ADMIN SUPPORT	5	5
WEIGHTED SCORE	8.5	10 pts

RELATIONSHIP MANAGEMENT
(Quarterly Update)

	ACTUAL	TARGET
CUSTOMER SCORE	46.08	60
SUPPLIER SCORE	46	60
ROLLED UP AVERAGE	46.04	60
WEIGHTED SCORE	15	20 pts

CRITICAL MILESTONES AND JOINT ACTIONS
(Monthly Update)

	ACTUAL	TARGET
OTD JAP ACTIONS SUPPLIER	100.00%	90.00%
OTD JAP ACTIONS BAE	100.00%	90.00%
OTD CRITICAL MILESTONES	N/A	95.00%
ROLLED UP AVERAGE	100.00%	91.67%
WEIGHTED SCORE	30	30 pts

Consists of four quadrants

1. Process and KPI's
2. Project Management
3. Relationship management
4 Critical milestones and joint actions

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Questions