CBO and RPBO in an Integrated Safety Oversight System

iSTARS iUG/01 18/Dec/2018

Who and What is EMPIC

- A German company founded 2001

- A standard software solution
  for aviation **regulators**

- An integrated system that
  collects all necessary data to handle

  - Aircraft registration

  - Personnel licensing and their medicals

  - Organisation approvals

  - Surveillance obligations (audits, inspections, evaluations)

  - etc.

  - Huge repository with > 500 database tables
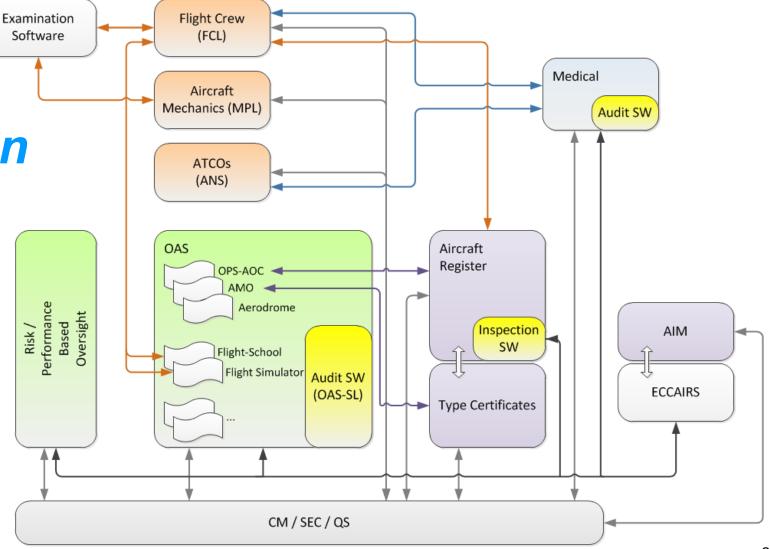
- 25 clients all over the world

Integration between aviation sectors and aviation objects

Data Integration at the Compliance Level

An excerpt from the regulation data model
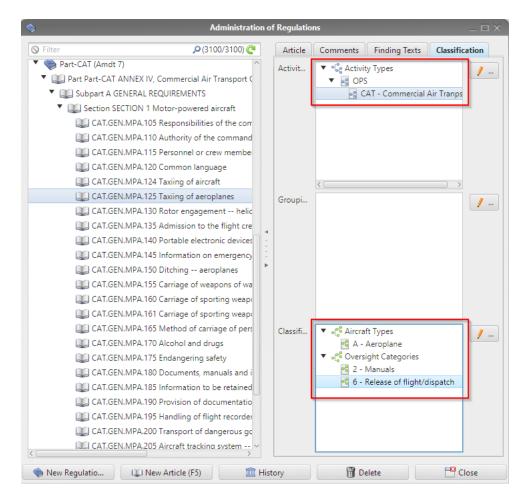
What kind of data we record and evaluate

Regulation structure

- Hierarchical regulation structure
- With management of amendments
- Taxonomies at regulation sections
  - Activity types
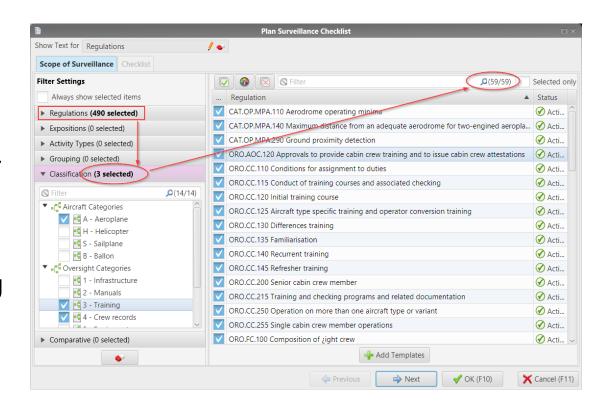 - Oversight categories
  - …

Planning scope of surveillance

- Regulation →
  Requirement set
  - Build sets of applicable requirements
  - Add multiple questions per requirement
- Scope of Surveillance
  - Regulation based planning
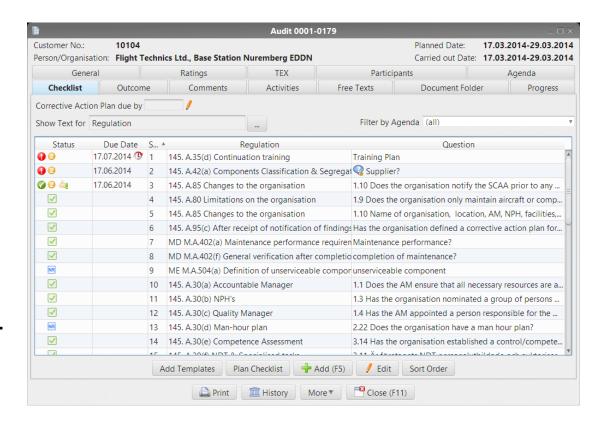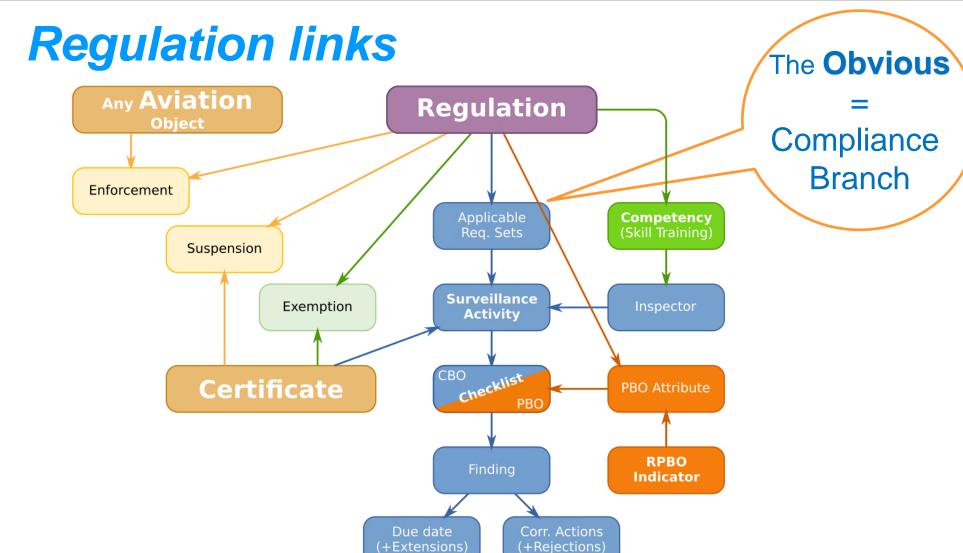 - Planning with the help of taxonomies

Surveillance checklist

- Finding linked to regulation
- Due date and due date extensions tracking
- Handling of
  - Corrective action
  - Corrective action plan (CAP)
  - Root cause analysis (RCA)
  - etc.
- RCA + Due date extensions …
  → A bit better than black&white
  → Can be used in Compliance Performance measurement

Regulation links
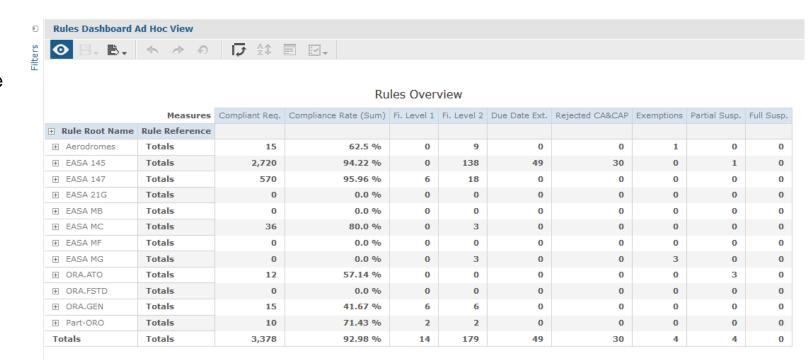
Regulation: Ad Hoc report

Ad Hoc reports can be compiled by medium skilled users.

Includes:

- Compliance Rate
- Findings
- Exemptions
- Suspensions

Results may raise questions like:

Why does this part of the reg. show so many findings and/or exemptions?

1. Insufficient industry performance?
2. Regulation too hard to follow?
3. Poorly written regulation?

Rules Dashboard Ad Hoc View

Filters

Rules Overview

Rule Root Name	Rule Reference	Compliant Req.	Compliance Rate (Sum)	Fi. Level 1	Fi. Level 2	Due Date Ext.	Rejected CA&CAP	Exemptions	Partial Susp.	Full Susp.
Aerodromes	Totals	15	62.5 %	0	9	0	0	1	0	0
EASA 145	Totals	2,720	94.22 %	0	138	49	30	0	1	0
EASA 147	Totals	570	95.96 %	6	18	0	0	0	0	0
EASA 21G	Totals	0	0.0 %	0	0	0	0	0	0	0
EASA MB	Totals	0	0.0 %	0	0	0	0	0	0	0
EASA MC	Totals	36	80.0 %	0	3	0	0	0	0	0
EASA MF	Totals	0	0.0 %	0	0	0	0	0	0	0
EASA MG	Totals	0	0.0 %	0	3	0	0	3	0	0
ORA.ATO	Totals	12	57.14 %	0	0	0	0	0	3	0
ORA.FSTD	Totals	0	0.0 %	0	0	0	0	0	0	0
ORA.GEN	Totals	15	41.67 %	6	6	0	0	0	0	0
Part-ORO	Totals	10	71.43 %	2	2	0	0	0	0	0
Totals	**Totals**	**3,378**	**92.98 %**	**14**	**179**	**49**	**30**	**4**	**4**	**0**

Regulation: Ad Hoc report

- Expand by regulation
- Start investigating at the detail level

Rules Dashboard Ad Hoc View

Rules Overview

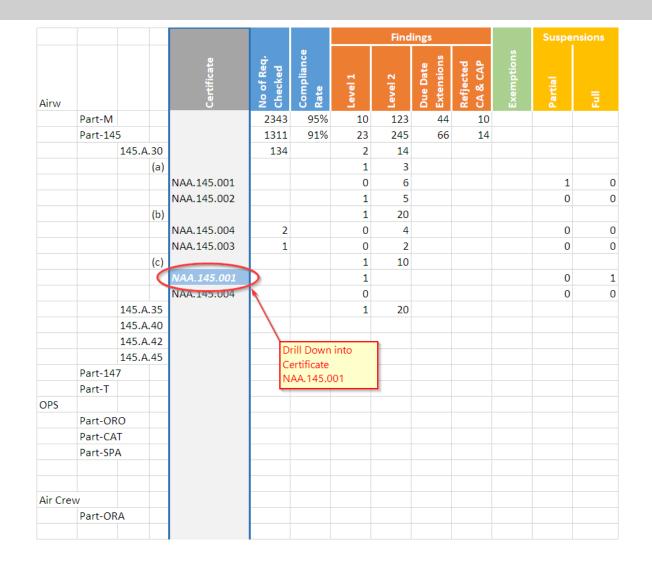| Rule Root Name / Rule Reference		Compliant Req.	Compliance Rate (Sum)	Fi. Level 1	Fi. Level 2	Due Date Ext.	Rejected CA&CAP	Exemptions	Partial Susp.	Full Susp.
Aerodromes	Totals	15	62.5 %	0	9	0	0	1	0	0
EASA 145	A.10	0	0.0 %	0	0	0	0	0	0	0
	A.15	0	0.0 %	0	0	0	0	0	0	0
	A.20	20	80.0 %	0	5	0	0	0	0	0
	A.25	2	100.0 %	0	0	0	0	0	0	0
	A.25 (a)	30	100.0 %	0	0	0	0	0	0	0
	A.25 (a)(1)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (a)(2)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (b)	20	80.0 %	0	5	0	0	0	0	0
	A.25 (c)	45	90.0 %	0	5	0	0	0	0	0
	A.25 (c)(1)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (c)(2)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (c)(3)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (c)(4)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (c)(5)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (c)(6)	0	0.0 %	0	0	0	0	0	0	0
	A.25 (d)	25	83.33 %	0	5	0	0	0	0	0
	A.30	0	0.0 %	0	0	0	0	0	0	0
	A.30(a)	35	100.0 %	0	0	0	0	0	0	0
	A.30(a)1	0	0.0 %	0	0	0	0	0	0	0
	A.30(a)2	0	0.0 %	0	0	0	0	0	0	0
	A.30(a)3	0	0.0 %	0	0	0	0	0	0	0
	A.30(b)	30	100.0 %	0	0	0	0	0	0	0
	A.30(b)1	0	0.0 %	0	0	0	0	0	0	0

Regulation: compliance dashboard (mock-up)

Common dashboard for

- Executives
- Management
- Analysts
- Inspectors

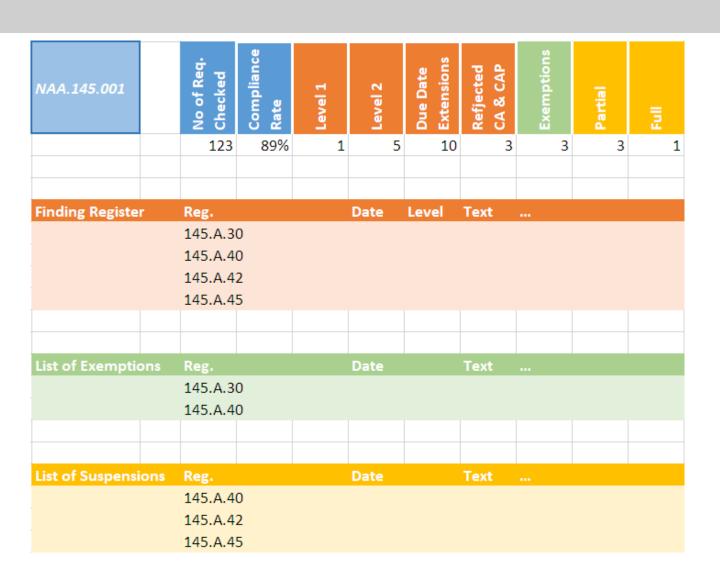|		Certificate	No of Req. Checked	Compliance Rate	Findings				Exemptions	Suspensions	
					Level 1	Level 2	Due Date Extensions	Rejected CA & CAP		Partial	Full
Airw											
	Part-M		2343	95%	10	123	44	10			
	Part-145		1311	91%	23	245	66	14			
	145.A.30		134		2	14					
	(a)				1	3					
		NAA.145.001			0	6				1	0
		NAA.145.002			1	5				0	0
	(b)				1	20					
		NAA.145.004	2		0	4				0	0
		NAA.145.003	1		0	2				0	0
	(c)				1	10					
		NAA.145.001			1					0	1
		NAA.145.004			0					0	0
	145.A.35				1	20					
	145.A.40										
	145.A.42										
	145.A.45										
	Part-147										
	Part-T										
OPS											
	Part-ORO										
	Part-CAT										
	Part-SPA										
Air Crew											
	Part-ORA										

Drill Down into Certificate NAA.145.001

Regulation: dashboard per certificate (mock-up)

The Organisation Data Sheet can be extended further by

- Number of outstanding findings
- Number of overdue findings
- Number of visits
- Number of change applications per year
- etc.

Highlight:

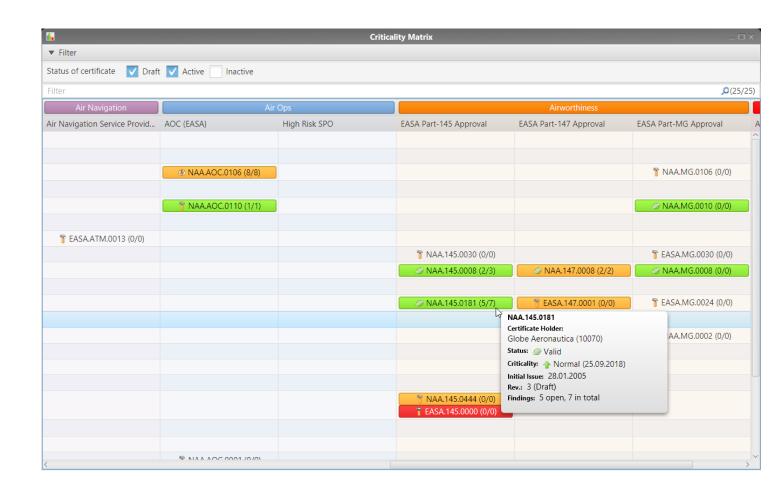- Although build from an external BI engine, single data records can be opened in EMPIC

NAA.145.001		No of Req. Checked	Compliance Rate	Level 1	Level 2	Due Date Extensions	Rejected CA & CAP	Exemptions	Partial	Full
		123	89%	1	5	10	3	3	3	1

Finding Register	Reg.	Date	Level	Text	...
	145.A.30				
	145.A.40				
	145.A.42				
	145.A.45				

List of Exemptions	Reg.	Date	Text	...
	145.A.30			
	145.A.40			

List of Suspensions	Reg.	Date	Text	...
	145.A.40			
	145.A.42			
	145.A.45			

Certificate centric dashboard

Using similar data as the compliance dashboard but this time a hardcoded cross-table

- Certificate holder vs.
- Certificate type

Open in the software from this view

- Certificate holder
- Certificate type
- List of surveillance activities
- Finding register

Data integration through compliance data

Regulation as Taxonomy

- Regulation links many different areas and aspects in EMPIC

- We can look at the regulation as being a big **taxonomy system** itself

**From Compliance Based (CBO)
to
Risk and Performance Based
Oversight (RPBO)**

RPBO in nutshell
If that's possible

- CBO
  - Rigid oversight programme or MSP (master surveillance plan)
  - Every service provider is treated the same way
  - Frequency and/or scope of surveillance activities are more or less fixed

- RBO
  - Oversight programme is adjustable
  - Collection of information (safety reports, SPIs, previous audits)
  - Analysis and prioritisation (planning frequency and scope)
  - Conduct on-site audit (prescriptive regulatory + performance checklists)

RPBO in EMPIC

- So what does *P* mean in RPBO - for EMPIC?
  - *Measurement* of performance as objectively as possible
  - Using existing data and dedicated assessments to build an
    - ORP (Organisational Risk Profile)
    - OSC (Organisational Safety Culture)
- What does *R* mean in RPBO – for EMPIC?
  - Risk based *Planning*
- And what is *O*?
- *Assess* the service provider on-site with
  - Compliance checklists
  - Performance checklists

RPBO Framework

Risk and Performance Based Oversight

PBO data collection

- Collecting different types of (raw) data
  - Facts (e.g. number of employees, fleet-size)
  - Assessed and rated surveillance elements (checklist)
  - Extracting existing data from EMPIC-DB

- Various data collection methods
  - Manual input by inspector (checklist)
  - Use data from EMPIC-DB using QuerySynthesizer

- Build ORP (organisational risk profile)
  - Compliance history (results of previous certification and/or oversight) *This is data from CBO!*
  - Specific nature of the organisation
  - Complexity of its activities
  - Operational risks

PBO data collection

- *Automatic*: Timer based snapshot data from the database into PBO attribute (no manual data entry needed):
  - Number of findings
  - Number of aircraft
  - Number of aircraft types
  - Number of approvals held

- *Manual*: Assessment through "Word Pictures" in checklist
  - Maturity of management
  - Level of outsourcing

Where does RPBO and CBO connect?
Give and Take in both directions

Give

- CBO is a good data provider
- Feeds into the Organisational Risk Profile

Take

- RPBO is the way to control what happens during CBO (Cycle, Content,…)
- CBO will remain a base line oversight method

Technically at data level

- Link regulation to a PBO attribute
- Via applying the same taxonomies to regulation and PBO attributes

Evaluate how CBO and PBO results correlate

RPBO

CBO

↑ RPBO Ligand

Y CBO Receptor

Organisational Risk Profile, bar chart ranking

Risk Based Planning (not yet in EMPIC)

The MSP is developed using a risk-based approach with the following set screws

- **Frequency** of visits
  - Oversight period
  - Number of visits
- **Content** of checklists
  - Focus areas
  - Depth of oversight
- **Resources**
  - Distribute the available inspectors

Difficult to implement: transform into a plan what you see in the evaluation report/dashboard - in a formalized way. But there is no formula!

EMPIC Interfaces / Data Sharing

- Data *export* from EMPIC via QS WebService
  - Everything from the database is available through our QuerySynthesizer (QS)
  - If YOU want access to data from the NAAs using EMPIC...
  - EMPIC is not the owner of the data, you must ask the NAAs

- *Importing* or *connecting* to data outside EMPIC
  For the sake of *Integrated Dashboards*, how to continue?
  - SPIs,
  - Flight hours of pilots
  - Flight hours of aircraft
  - Generally: globalised aviation, who has the data?
  - In other words: *collect or connect* to avoid a fragmented view?

Possible Cultural Change in the NAA
Integrated Dashboards → Integrated NAA

Today (exaggerated)

- Monthly report prepared by a group of analysts
- Handed out to upper management → meetings, discussions, decisions
- Management informs inspector what to do
- Inspector hasn't seen the analysts' sources nor all the reports, doesn't understand "why"

Benefits of Integrated Dashboards

- Management does not have to wait until Friday
- Analysts can do the real cool stuff
- Everybody has access to the same information

The new NAA

- Reasons for decisions are transparent
- The inspector sees what his input is used for, complains less about all the data he has to record
- Various views are based on the same data
- This data is living in a system that represents the single place of truth.

Cost to collect data

Questions:

- What justifies the efforts to collect and process data (not speaking about mandatory reporting here)
  - Manual recording, processing…
  - Evaluating, transferring the outcome into new plans
- When do you demonstrate/proof that the data was useful in the end?
- How can an NAA "push" the industry to report or transmit data outside mandatory or voluntary reporting (operational data, e.g. like flight hours)?
  - Build data interfaces, automate where possible
  - But even interfaces cost (development, operation…)

Conclusion

All stake holders involved in safety oversight

- From the Director General
- To the inspector

Should have access

- To the big picture of the national aviation system
- Supported by visualization of aggregated data in dashboards

EMPIC believes this is best achieved

- By avoiding media discontinuity
- And giving access to built-in dashboards within the Safety Oversight Management System.

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We are happy to discuss your questions!

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