In a recent article on digitally-aided ship maintenance in Ship Management International, David Tinsley noted: “In the aviation sector, unerring development and adoption of condition monitoring is considered to have been a key contributor to the industry’s improved safety record over the last 20 years. The potential safety implications of such initiatives in the shipping sector should not be understated.”

The sky’s the limit

Martin Frutiger

The airline industry is known for leading the way in applied technology. What other industries might not realise is just how far ahead air transport is in the digital sphere.

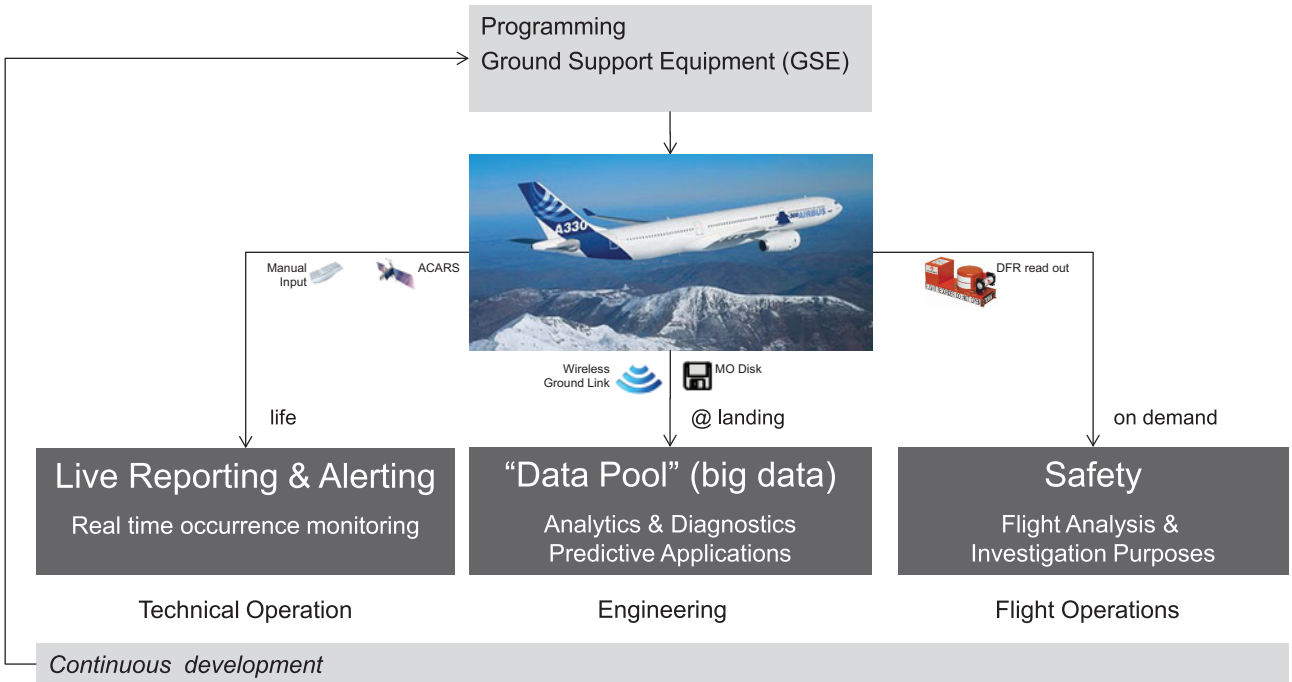
A modern passenger jet can generate up to half a terabyte of data on a single flight, reading from as many as 200 000 parameters. While not all this information can be put to use from every flight, enough is being used to make Boeing state that operators and service providers need to be fully networked in order to operate their aircraft efficiently.

“These are what Boeing calls ‘enabled aircraft’”, says Martin Frutiger, customer program manager at SR Technics, a world leading MRO service provider with more than 80 years of operational experience serving both large and small carriers.

A veteran of airline maintenance ICT since 1991, Frutiger remembers the old analogue aircraft as well, but is not nostalgic. His enthusiasm is too great for today’s giant generators of data for that. “The aircraft from the 1980s were highly mechanical, with fewer sensors and none of today’s data busses, and of course very limited data storage, and no real-time transfer.”

“Today, connectivity is everything,” he maintains, “Not only for passengers who want WiFi onboard, but for the aircraft, the manufacturers, and the service providers. Working with live streaming data gives us the opportunity to have a true picture of the real-time state of the aircraft.”

The global coverage network for air to ground communication is provided by satellite over the oceans, or by surface antennae over land. “But regardless of infrastructure, the system will always try to select the least expensive con-



Aircraft connectivity and data flow

nection for data transfer," says Frutiger.

The data he refers to is technical information, not large files, but mostly snapshot data. "The sensor data is the same as the crew uses in the cockpit, simply relayed to a ground station," he explains.

For each discrete component of operation there are standardised reports: for the engine, superstructure, performance monitoring, etc., in addition to an array of customised reports. Any parameter limits exceeded are captured and transmitted to enable planning and mitigation from the ground. Pilots can also report from the cockpit to the main operation centre, allowing a combination of human and machine communication.

More than just the machine

Airlines are required to maintain flight operation quality assurance programs. These programs monitor the pilot and crew as well, not just the plane, providing a continuous data stream that enables analysis of historical records in order to track performance over time.

"Any patterns that require correction can be addressed and mitigated as necessary," Frutiger says, illustrating the interaction between the human element and Big Data.

But the airlines are not alone in wanting to use the data generated by these aircraft. "Manufacturers also want to use the data. They are interested in the after sales market too. They want to provide total service to operators," Frutiger reports.

Another positive effect of data exploitation, Frutiger reports, is that in addition to using data to maintain the aircraft, manufacturers use the information to improve future models. "In that way streaming and accumulated data is contributing not only to more efficient maintenance now, but to better designs in the future," he observes.

Big Data, big savings

But for Martin Frutiger and SR Technics, the big advantage of streaming data from aircraft in service is in better, more efficient maintenance. "The standard today is rule-based, planned maintenance at fixed time intervals, with replacement and maintenance of parts and equipment regardless of condition," he relates.

"Real-time diagnostics can reduce unnecessary expense by allowing service only as needed. I think conditioned-based maintenance will be the future standard," he says, adding that predictive maintenance will probably not be far behind. "The data is available, we just need to be able to use it

in a structured and 100% reliable way."

And therein lies one of the conundrums of rapid digital development: "Some airlines lack the necessary expertise due to rapid progress in technology," he relates. "Many smaller airlines are suboptimal in monitoring and use of data in maintenance. They feel backed in a corner by all the new demands," he confides. "They can literally be overwhelmed by the changes."

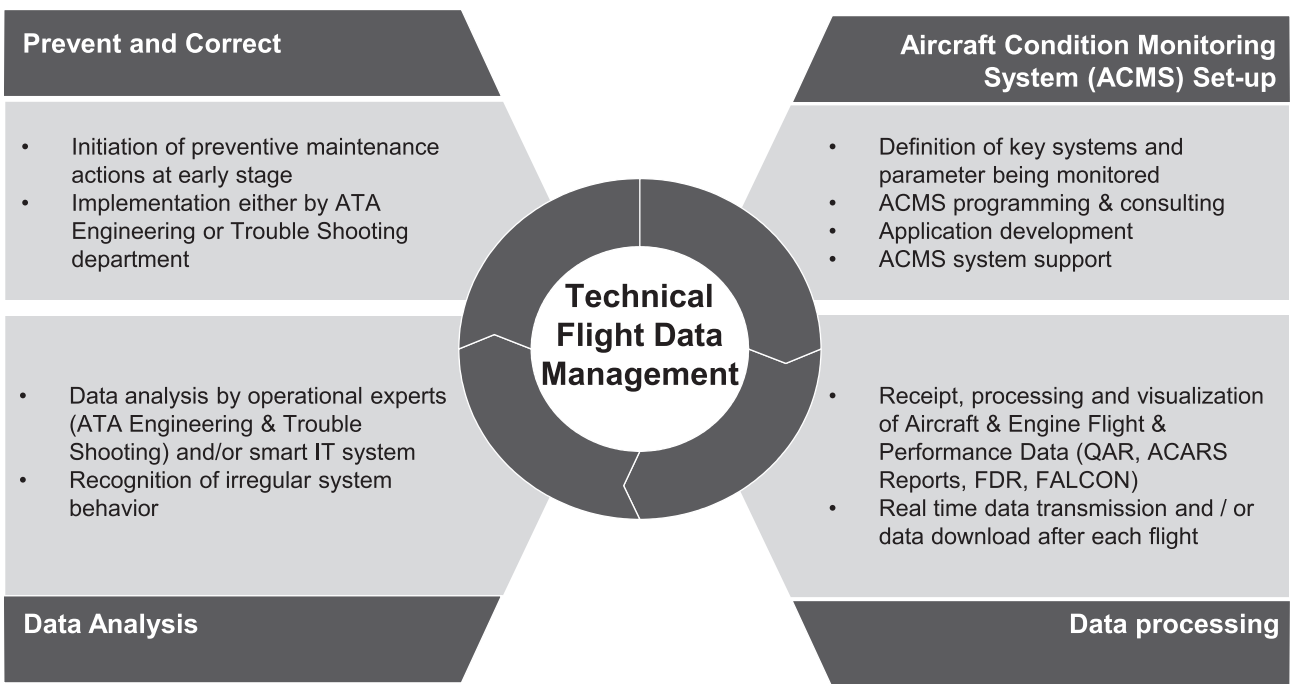
Ready, set – gone

Those who may be feeling overwhelmed today, better be prepared to get caught up. The pace of development is certainly not lessening with time, as witnessed by Martin Frutiger's prediction for the next steps in air transport connectivity:
"I believe direct communication between aircraft is next. If one crew has information about weather, or anything else of importance, that information can be streamed to aircraft following behind, or queries can be sent ahead."

Aircraft-to-aircraft, passenger-to-passenger, locating black boxes from streaming data, data streaming and full phone service from the air – all this will be standard in the very near future, Frutiger believes.

While in some of these areas maritime is actually ahead of aviation, there is much for shipping to learn from the airline industry, in both the pace and the scope of data generation and utilisation. More than just sensors, devices, and 'smart things,' shipping can look to aviation for new approaches to managing data, leveraging infrastructure, transforming services, and building new business models.

The sky's the limit.



Aircraft engineering services – capability and service overview