AVIATION WEEK & SPACE TECHNOLOGY

Small Figures, Big Returns

10/26/2009
Aviation Week & Space Technology

The path of international defense collaboration is littered with good intentions, and often little else, particularly in the European arena. Multilateral efforts, even successful ones, pose significant challenges for participants. All too often, programs have fragmented or collapsed under the weight of national and industrial imperatives.

But in recent years, the guided-weapons sector has managed to navigate better than most the shoals of European collaboration, despite the region's checkered collaborative history in this arena—most recently the abortive multinational Trigat anti-armor missile family program.

London and Paris are at the heart of this renewed collaborative achievement, with European missile manufacturer MBDA as its industrial lifeblood. The comparative success of MBDA is also providing the basis for increasing ties between France and the U.K. in the missile arena, and contributing to broader efforts to more closely align the two state's defense needs, most visibly in the Anglo-French High-Level Working Group.

The active radar seeker for MBDA's Common Anti-Air Modular Missile is now being tested. CAMM could benefit from the MCM-ITP work.*Credit: MBDA*

Common guided-weapons requirements—and the need for industrial consolidation—provided the fabric to draw together the European companies that now make up MBDA. This model for collaboration is now being replicated at the research and technology (R&T) level with a bilateral program. The work is focused on the first four technology readiness levels (TRLs). TRL1 is, in effect, basic principles, while TRL4 is the point at which subsystem performance has been validated in a laboratory.

An early success of the Anglo-French High-Level Working Group—established in 2006 to look at boosting defense collaboration—is the Materials & Components for Missiles Innovation & Technology Partnership (MCM-ITP). Rather than focus on present weapons requirements, the initiative is driven by a grand vision of developing technologies for the next generation of systems, or for insertion into the current generation of weapons. An additional pragmatic push comes from the reality that, irrespective of the rhetoric about the importance of R&T funding, budgets are under severe pressure.

The MCM-ITP, by pooling funding from London and Paris, is intended to maximize the return on

investment and avoid duplicating efforts. Launched at the end of 2007, the program is led at the industry level by MBDA, with the U.K.'s Defense Science & Technology Laboratory and France's DGA taking the lead technical role on behalf of the two defense ministries.

Andrew McBride, head of the MCM-ITP at MBDA, points to some basic figures uInderpinning the collaboration. France and the U.K. account for 40% of European defense spending, around 70% of R&T funding and 60% of the industrial base. Thus, there is logic in the two states collaborating, he says.

The most recent Anglo-French summit, held in July between Prime Minister Gordon Brown and President Nicolas Sarkozy, reinforced collaborative ambitions. "It is our common and strategic interest to sustain and develop industrial and technological skills in Europe," they stated. "Research and technology is critical, and the U.K. and France play a leading role in Europe in investing in this area."

Alongside MBDA, the other industry partners in the MCM-ITP are Qinetiq, Microturbo, Nexter Munitions, Roxel, Selex Galileo, Thales Air Systems and Thales Missile Electronics. The overall program is broken down into eight domains (see box, p. 71), all but one of which explore components or subsystems for guided weaponry. Befitting the bilateral effort, four of the domains are led by British companies and four by French.

The only domain to actually consider potential weapons is Domain 1, which is carrying out system-level studies. Areas of interest identified include micro-munitions and missiles dedicated for unmanned combat aircraft applications.

Funding for the project is comparatively modest—around £12 million ($19.6 million) annually, split equally between the defense ministries and participating companies. Running initially for three years, there is an option to extend the program for a further two years. Emma Morris, of MBDA's business development directorate, says the present contract concludes at the end of 2010, and a decision whether to continue for another two years will be made during the participating nations' forthcoming spending rounds. Given the success so far, an extension appears likely.

The MCM-ITP, however, is not just geared to supporting R&T work among the primes and first-tier suppliers. A key aim is to involve small and medium-size enterprises (SMEs) and academic institutions to identify and drive innovation. In the case of academia, McBride says, the requirement for matching funding can be provided "in kind"—for example, through research workers' time and laboratory use.

The U.K.'s 2005 Defense Industrial Strategy (DIS) recognized the need for a "more effective engagement with the so-called lower-tier suppliers; namely, the small and medium-size enterprises and universities that are often involved in the development of very novel technologies and materials." The MCM-ITP provides one of the main delivery mechanisms for this—the program including the goal that SMEs and academia garner 30% of the workshare. Approaching two-thirds of the way through the project, this figure already has reached 27%.

Identifying and approving the structure for the bilateral effort, and determining the ground rules for participation, were considerable tasks. "There were 18 months of hard negotiation between the U.K. and French defense ministries and industry," says Morris.

But first the thorny topic of intellectual property rights (IPR) had to be resolved satisfactorily for all potential participants. In the past, IPR issues limited companies' willingness to join in collaborative R&T because of concern over the loss of commercial advantage. "Everyone had to be absolutely comfortable that their golden nuggets were protected."

The approach adopted categorizes three levels of technical information. Category A is in effect open publication; Category B material is not deemed suitable for open publication, but does not include commercially sensitive data; and the third is commercially sensitive information. While the defense ministries have unrestricted use of Category A information, the other two are more restrictive to protect IPR.

At their highest level, the areas of interest are drawn from the respective French and U.K. technology plans: in the case of London, the DIS and Defense Technology Strategy and for France, the 30-Year Prospective Plan (PP30). Both documents provide top-level system requirements that form the template under which the MCM-ITP operates. Discussions between the two governments' science labs and industry participants then determined detailed areas of interest such as weapon performance, utility, survivability, safety, affordability and supportability.

The first MCM-IPT annual conference was held last summer, with participants giving briefings on projects that had been selected for funding during the first year. Following initial work, some of the efforts have been "parked," or deemed not to offer sufficient payback, while others will continue into a period of funded research. Projects are considered on a six-month cycle. In the first phase, 23 projects were funded out of 60 submissions.

The next MCM-ITP conference will be held in Manchester, England, in October 2010, where the findings of work being carried out this year and next will be briefed. Examples of projects launched during the first year that are also being funded in the second include a Ka-band seeker concept being developed by Thales Systems and Thales Missile Electronics, and a thrust-vector-control project led by Roxel France.

Thales's "Ka-band MEMS reflect-array" study is looking at the use of micro-electromechanical systems technology to develop an active, electronically scanned array (AESA) for a guided weapon. MEMS-based phase shifters promise to be low-loss, low-cost devices. Traditional transmit/receive elements in an AESA are a major cost driver and have so far militated against the technology's use in guided weapons. The second year of funding will build a reflect array for lab testing.

Roxel's "Morphing Exit Cone" work into thrust-vector control is looking at the use of "movable surfaces in the exit cone withstanding hot gases for long durations." The configuration will likely be four control surfaces, dubbed "palettes," within the nozzle. The second year of work involves determining which material is best suited to the palette concept, along with detailed design of an actual nozzle, with manufacturing and lab testing envisioned for the third year.

While the MCM-ITP still has at least one more year to run, and will probably continue through to the end of 2012, the participants are already beginning to consider how to build on the project's initial success. "Do we have a son of ITP; do we maintain it for another five years; do we extend the technology readiness level? All of these things are starting to be debated," says Morris, "because we've established that the ITP works."

Materials & Components for Missiles Innovation & Technology Partnership

(Research Domains and Industrial Leads)	
Domain	Lead
System Studies	MBDA
RF Sensor Studies	Thales
IR Sensor Studies	Selex
Rocket Propulsion	Roxel
Air-Breathing Propulsion	Microturbo
Warheads	Qinetiq
Fuzes	Thales
Materials/Electronics	MBDASource: MBDA

Author(s) : Douglas Barrie

European early-stage, guided-weapons research could provide high rewards