NIST
U.S. Department of Commerce
Director's Office/International
and Academic Affairs Office (IAAO)

BIRD
U.S. –Israel Binational Industrial
Research and Development
Foundation

Date: 5/18/2020   Name of Evaluator: [redacted]

BIRD Project Evaluation Form

1. **General Information**

   U.S. Company: MARTIN Technologies

   Israeli Company: Redler Technologies Ltd

   Project Title: Advanced Automotive ESPDM – Electronic Smart Power Distribution Module

2. **Budget**

Project duration (months)	Israeli Company ($)	Israeli Company (%)	U.S. Company ($)	U.S. Company (%)	Total Budget ($)
24	$503,059.00	50.3059	$496,940	49.6940	1,000,000

3. **Evaluation**

Area	Rating*	Explanation (expand below as needed)
Technology	B	
Business Potential	B	
Capability of Companies	B	
Overall Rating	B	

   * Rating: **A** = excellent, top proposal seen lately, **B** = good, high potential for success; **C** = fair, success with little   innovation; **D** = problematic, lack details describing idea; **E**= recommend to reject, lacks details in multiple areas

4. **Comments – (maximum three pages)**
   Overall comment on the application and a recommendation for the BIRD foundation: The technical merits of this application are good; however, any reader of this proposal gets continuously distracted by the terrible English grammar and vocabulary, as if the writer is not a native English speaker. It is clear that no *one has reviewed or edited this proposal for English grammar and vocabulary* prior to its submission. Moreover, it begs the question: why was it accepted for review? *It would help if the OIAA would pre-review applications and give the authors the time to resubmit it with improved grammar.* That would make a reviewer's job much less stressful and give the reviewer time to think more clearly about the merits of the proposal.

   Also, an apparent lack of English editing, plus the juxtaposition of detailed information about Redler (the Israeli partner) next to sparse information about Martin (the American partner) leaves this reviewer wondering if Martin read the proposal or participated in its creation. More is said on this in the section on synergy between the companies.

   The Product and the Technology

(Include description of the technological innovation, challenges and assessment of technological risks)

Electronic Smart Power Distribution Module (eSPDM) uses Redler patented electronic smart circuit breaker technology to attempt to reduce the cost, weight and complexity of automotive wiring harnesses. Currently the technology is in-use in military applications and shall be scaled down in size, weight and cost for emergency vehicle and then for consumer automotive use.

While other efforts have been made to de-centralize automotive fuse and breakers and use digital communications to reduce wiring cost, weight, and volume, the major innovation claimed is Redler's patented arc-detecting electronic circuit breaker. This can be used not only to protect automotive circuitry in the event of failure, but also predict impending failure.

Low technological risk (10%-29% probability of occurrence) exists in the failure to reduce the technology size and cost.
Medium (30%-49%) risk of failure to attain numerous certifications to requisite safety standards.
Medium risk due to programming complexity at the OEM facilities.
Medium risk of being unable to attain a reliable, cost-effective arc detection system.

Further risk exists in the market and is explained in the market section of this review

Project Plan (Including major tasks, collaboration and share of responsibilities between partners, main milestones)

1. Design product's HW, SW and mechanical plan (47% Redler, 52% Martin), Sep-Dec 20
2. Product design - analysis and simulation (62% Redler, 58% Martin), Sep-Dec 20
3. Product manufacturing drawing design (47% Redler, 52% Martin), Oct 20 – Jan 21
4. SW Design plans (56% Redler, 44% Martin), Sep-Oct 20
5. GUI and peripheral SW design plan (39% Redler, 61% Martin), Sep-Oct 20
6. Products proof of design (POD) plan (44% Redler, 56% Martin), Sep-Nov 20
7. Prototypes (44% Redler, 56% Martin), Feb-May 21
8. Set-up for tests and make testers (32% Redler, 68% Martin), Mar-Jul 21
9. Embedded and GUI SW coding (57% Redler, 43% Martin), Aug – Nov 21
10. POD (Proof of Design) execution (50% Redler, 50% Martin), Sep – Dec 21
11. Modification HW, tests, setup, SW (46% Redler, 54% Martin), Nov 21 – Feb 22
12. Certifications tests (40% Redler, 60% Martin), Jan – Aug 22
13. Demonstrator (66% Redler, 34% Martin), Feb – Jul 22
14. Production Readiness Review (PRR), Manufacturing tools and preparations (91% Redler, 9% Martin), Mar – Aug 22

The Budget (Realistic or not)
Total budget: $2,512,334 (50% Redler, 50% Martin) seems realistic.

The Market (Including evaluation of commercial potential)

No.	Cash-Flow component	Derivation				N = No. of Years				
Y	Calendar year	1st Calendar Year	2020	2021	2022	2023	2024	2025	2026	2027
	Project year		1	2	3	4	5	6	7	8
Q	No. of units sold (Units)	estimate				1,725,867	3,451,734	10,355,201	17,258,668	27,613,868
P	Product Price ($/unit)	estimate			7	7	7	7	7	7
S	Product Sales (K$)	=QxP or estimate		0	0	12,081	24,162	72,486	120,811	193,297
M%	Manufacturing Cost (% of sales)	40%				40%	40%	40%	40%	40%
M	Manufacturing Cost (K$)	=M%xS		0	0	4,832	9,665	28,995	48,324	77,319
O%	Operating Expenses (% of sales)	40%				40%	40%	40%	40%	40%
O	Operating Expenses (K$)	=O%xS		0	0	4,832	9,665	28,995	48,324	77,319

To this reviewer, the plan to approach the market is realistic, te overall market analysis appears solid with good references and the projections of market share seem realistic.   The cost of goods sold ($7.00 per unit from the outset) seems optimistic to this reviewer. More realistic may be a downward scale where $7 per unit may be attained after 2 or 3 years with increasing volume and experience.

Low risk factor (10% - 29% probability of occurrence) in attaining the overall system prices to compete in the market
Medium risk factors (30% - 49%) in the ability to convince OEMs to implement the new harness concept.

Capabilities of the Companies (Technical & commercial)
Both companies are complementary in their capabilities and have good experience in their respective marketplaces.

Medium risk factor is companies have scant software design experience so contractors will be needed.   Using contractors do not afford retention of knowledge of the all-important software design.

Production plans (Who, what, where, when, etc.)
 Production will be managed by both companies in partnership, with Redler being responsible for electronic production and Martin for the mechanical production. Arrow will be the parts supplier and Arrow has a long history ad good reputation for supplying parts worldwide.

Electric assembly will be done by a 3rd party electronic assembly company in Isreal who has a history of working with Redler and has the capability to achieve the near-term volume goals and expand to meet the longer term goals.

On the American side, things are less clear, as discussed below in the "synergy" section, scant information about Martin's third-party vendors will be is included in the application.

Benefit to the Israeli Company (If known)
50% of the profits projected to be $1.6 M in 2026 and $17M in 2026 after sales commissions will go to Redler. Also, royalties for the patented IP will go to Redler.

Further benefit can come from ancillary products and market opportunities for this technology.

Benefit to the U.S. Company (If known)
50% of the profits projected to be $1.6 M in 2026 and $17M in 2026 after sales commissions will go to Martin.

Further benefit can come from ancillary products and market opportunities for this technology.

Synergy between the Companies
The application seems to be the most difficult to assess because it seems that the proposal was 100% written by Redler Technologies (the Israeli company) and does not appear to have been edited by Martin (the U.S. partner). Some areas of the application show a great deal of internal information about Redler next to scarce information about Martin, leading this reviewer to wonder why, if Martin reviewed the proposal, did they not provide the detailed information.

This reviewer notes that all of the ISO/AS-9100 procedural and conformance documents listed to be used are Redler internal documents and wonders if this is acceptable to Martin.

Other than the above concern, the two companies appear to have highly complementary capabilities across the entire range of technological and commercial requirements and would make, in my opinion, good partners for this proposed project.

Pros (In your opinion)
Reducing the cost and complexity of automotive wiring harnesses, will help keep automobile prices affordable. This system can also increase power carrying capacity while reducing energy losses which will assist in the growth of the electric vehicle markets. Reducing the weight of wiring harnesses helps reduce carbon emissions and assists in meeting the U.S. and international targets for future carbon emissions.

These two companies have the intellectual property and complementary capabilities for seeing this project to completion.

<u>Concerns</u> (In your opinion)

As mentioned several times, my greatest concern is that Martin (the U.S. Partner) does not seem to have been greatly involved in the drafting of this application. Foremost, why was the application not edited for English grammar? Secondly, why is there detail on Redler and their manufacturing vendors where there is scant information (other than short resumes of employees) . Finally, all the ISO/AS-9100 documents are Redler documents. Has Martin agreed to use Redler's proceedur3es documents?

Another concern is the need to use consultants for the software programming. The only SW engineer employee is a test engineer with 2 years of expeience. The software is complex in several areas, the OEM (car maker) will need to interface to the software and configure the devices for their applications, the arc detection requires sophisticated firmware, and GUI's and software documentation needs to be created. Additionally, the software must undergo certification for safety compliance. If contractors are used, what does that leave the two companies in regards to their in-house corporate understanding for future maintenance and revision of the software?