

## Appendix A. KEEN Grant Survey.

1. Please rate your current level of knowledge/ability regarding identifying an opportunity.

Low		Medium		High
0	1	2	3	4

2. Please rate your current level of knowledge/ability regarding investigating a market.

Low		Medium		High
0	1	2	3	4

3. Please rate your current level of knowledge/ability regarding creating a preliminary business model.

Low		Medium		High
0	1	2	3	4

4. Please rate your current level of knowledge/ability regarding examining technical feasibility, customer value, societal benefits and economic viability.

Low		Medium		High
0	1	2	3	4

5. Please rate your currently level of knowledge regarding testing concepts quickly via customer engagement.

Low		Medium		High
0	1	2	3	4

6. Please rate your currently level of knowledge regarding assessing policy and regulatory issues.

Low		Medium		High
0	1	2	3	4

7. Please rate your currently level of knowledge regarding determining design requirements.

Low		Medium		High
0	1	2	3	4

8. Please rate your currently level of knowledge regarding performing technical design.

Low		Medium		High
0	1	2	3	4

9. Please rate your currently level of knowledge regarding analyzing design solutions.

Low		Medium		High
0	1	2	3	4

10. Please rate your currently level of knowledge regarding creating models and prototypes.

Low		Medium		High
0	1	2	3	4

11. Please rate your currently level of knowledge regarding validating designs.

Low		Medium		High
0	1	2	3	4

12. Please rate your currently level of knowledge regarding communicating engineering solutions in economic terms.

Low		Medium		High
0	1	2	3	4

13. Please rate your currently level of knowledge regarding communicating engineering solutions in terms of societal benefits.

Low		Medium		High
0	1	2	3	4

14. Please rate your currently level of knowledge regarding validating market interest.

Low		Medium		High
0	1	2	3	4

15. Please rate your currently level of knowledge regarding developing partnerships and building a team.

Low		Medium		High
0	1	2	3	4

16. Please rate your currently level of knowledge regarding identifying supply chains and distribution methods.

Low		Medium		High
0	1	2	3	4

17. Please rate your currently level of knowledge regarding protecting intellectual property.

Low		Medium		High
0	1	2	3	4

## Appendix B. Summary Pre- and Post-Years 1-3 (2015-2017) Survey Results.

### Survey Questions

- Q1: Identifying an opportunity
- Q2: Investigating a market
- Q3: Creating a preliminary business model
- Q4: Examining technical feasibility, customer value, societal benefits and economic viability
- Q5: Testing concepts with customers
- Q6: Assessing policy and regulatory issues
- Q7: Determining design requirements
- Q8: Performing technical design
- Q9: Analyzing design solutions
- Q10: Creating models and prototypes
- Q11: Validating designs
- Q12: Communicating engineering solutions in economic terms
- Q13: Communicating engineering solutions in terms of societal benefits
- Q14: Validating market interest
- Q15: Developing partnerships and building a team
- Q16: Identifying supply chains and distribution methods
- Q17: Protecting intellectual property

### Year 1 (2015) Pre- and Post-Results by Q1-Q17 Averages, Percentages, and Standard Deviations

	2015 Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Pre	2.39	1.47	1.26	2.03	1.83	1.68	2.83	2.84	2.96	2.93	2.43	2.26	2.20	1.66	2.69	1.71	1.92
Pre SD	0.632	0.9	0.834	0.941	0.743	1.242	0.737	0.775	0.516	0.676	0.862	0.961	1.13	0.64	0.915	0.91	1.06
Post	2.94	2.58	2.24	3.01	3.07	2.58	3.60	3.58	3.60	3.54	3.36	3.01	3.28	2.47	3.10	2.31	2.75
Post SD	0.594	0.737	0.756	0.756	0.704	0.724	0.64	0.488	0.516	0.516	0.64	0.535	0.70	0.743	0.68	0.799	0.64
% Change	23%	76%	78%	48%	68%	54%	27%	26%	22%	21%	38%	33%	49%	49%	15%	35%	43%

### Year 2 (2016) Pre- and Post-Results by Q1-Q17 Averages, Percentages and Standard Deviations

	2016 Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Pre	2.60	1.58	1.11	2.4	1.95	2.09	3.23	3.28	3.18	3.18	2.89	2.47	2.49	1.74	2.68	1.74	2.39
Pre SD	0.64	0.89	0.825	0.976	0.74	1.02	0.722	0.747	0.519	0.671	0.859	0.97	1.04	0.71	0.873	0.98	1.12
Post	3.12	2.53	1.99	2.96	2.90	2.48	3.55	3.48	3.49	3.45	3.30	3.02	3.21	2.62	3.11	2.34	2.98
Post SD	0.618	0.761	0.775	0.828	0.727	0.863	0.639	0.597	0.521	0.594	0.775	0.743	0.862	0.684	0.676	0.831	0.756
% Change	20%	60%	79%	23%	49%	19%	10%	6%	10%	8%	14%	22%	29%	51%	16%	34%	25%

### Year 3 (2017) Pre- and Post-Results by Q1-Q17 Averages, Percentages and Standard Deviations

	2017 Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Pre	2.10	1.38	1.08	1.82	1.95	1.57	2.97	3.15	3.03	3.15	2.15	2.15	2.31	1.74	2.77	1.74	1.75
Pre SD	0.92	0.953	0.958	1.02	1.14	1.12	0.829	0.795	0.877	0.876	0.731	1.02	1.03	0.852	0.852	1.02	1.26
Post	3.18	2.68	2.48	2.97	2.92	2.45	3.48	3.55	3.53	3.52	3.02	3.02	3.11	2.59	3.14	2.62	3.10
Post SD	0.701	0.857	0.827	0.86	0.922	0.955	0.644	0.622	0.622	0.648	0.816	0.806	0.833	0.667	0.667	0.915	0.768
% Change	51%	94%	130%	63%	50%	56%	17%	13%	17%	12%	40%	40%	35%	49%	13%	51%	77%