SEPnet Industry Survey 2018

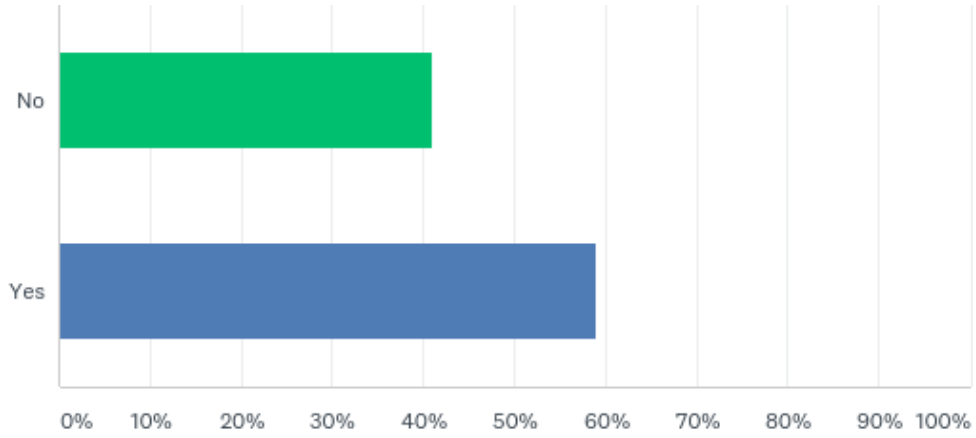
The Government's new Industrial Strategy pledges to increase investment in R&D and skills development for the nuclear industry; energy; data analytics, digital and satellite technologies; healthcare; manufacturing and robotics – all areas relevant to physicists. The new Knowledge Exchange Framework (KEF) aims to benchmark how well universities are doing at fostering knowledge sharing and research commercialisation and capture the network of collaborations between universities and businesses.

SEPnet (South East Physics Network) is well-placed to support these initiatives by building on our partners' research strengths and making more effective use of our shared industry contacts and networks.

56 companies, comprising SMEs, large corporates, NGOs and research institutions in a range of sectors including healthcare, defence, data science, satellite technology, engineering and other areas responded to SEPnet's recent survey to find out how it can better support business needs through greater collaboration with universities and help address skills shortages.

Please see below a summary of the key findings and main comments

.Q1: In the last five years, have you had contact with a university physics department on matters of knowledge exchange?



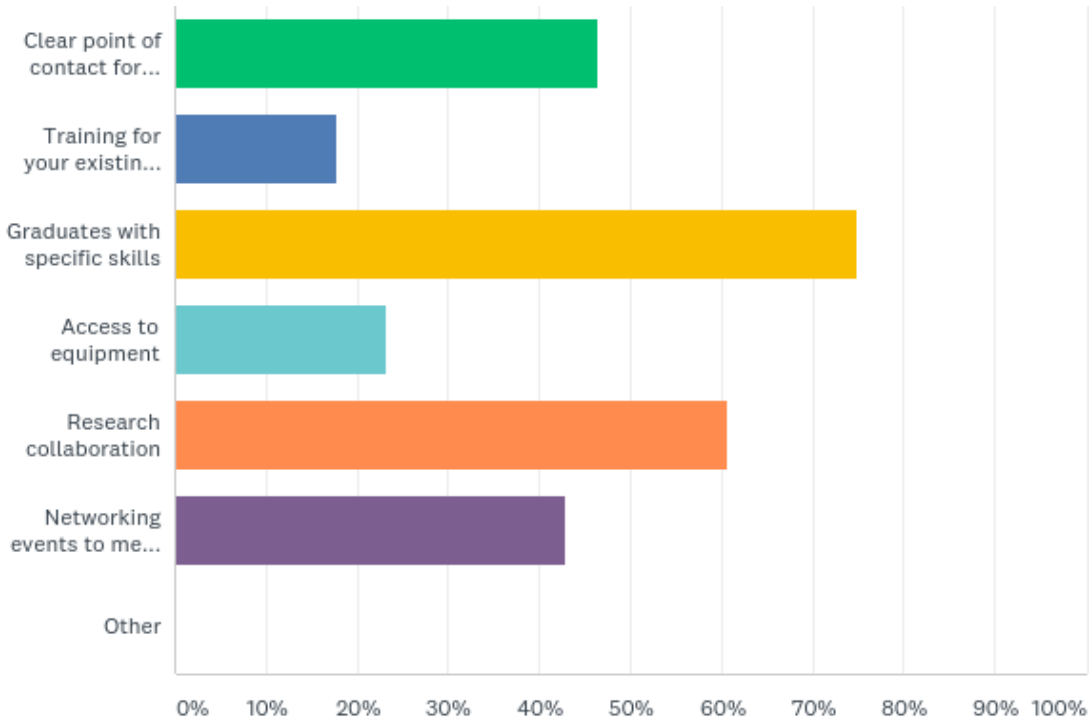
Q2: If yes, please briefly describe the outcome: Do you regard the interaction(s) as a success? If so, why? If not, why not?

- Started with aim of collaborating on measurement of particular devices but in the end the university acted as a contractor measuring devices on our behalf.

The project was a success, however the work done and cost was higher than initially expected and a lasting relationship was not formed.

- We have organised and run a number of collaborative studies. These projects have generally gone well and allowed us to investigate far more than we would have in-house.
- We have ongoing collaborations. Some are more responsive than others. In general, those that can bring the time scales closer to what an SME cares
- Collaborated with KTPs, interns, PhD students, CDT students and have commissioned research. Outcomes have been very positive.
- We are in the throes of establishing deeper relationships with targeted universities on our Academic Engagement Plan.
- It is still on-going but we already regard it as a successful partnership as mutual access to equipment and knowledge allows us to further our product development.
- We engaged in a KTP but not with a physics department. The interaction was not a successful as hoped, in my opinion, because of a reluctance to comprehend and build on the IP and ideas of the company's engineers.

Q3: Which of the following are/would be most important for your business when engaging with universities? Please tick the 3 most important and add details below.



ANSWER CHOICES	RESPONSES	
Clear point of contact for advice and signposting	46.43%	26
Training for your existing staff	17.86%	10
Graduates with specific skills	75.00%	42
Access to equipment	23.21%	13
Research collaboration	60.71%	34
Networking events to meet researchers, PhDs and other businesses	42.86%	24
Other	0.00%	0
Total Respondents: 56		

Comments:

- Important to be able to tap into skills and knowledge of academic staff, perhaps through the mentoring of any student placed with us.
- Future innovations to support clinical work start at pre-translational stage and some specialist skills are in place or transferable from university departments.
- We are keen to give students with relevant skillsets the opportunity to work. Currently many universities are not well organised with this and not helping their students to get in to work.
- I expect universities to teach fundamental knowledge to their students.
- Any methods for highlighting opportunities for collaboration or routes to new technologies or products for us.
- As the manager of a business incubator the most important things for me are access to talent for my incubatee companies
- Recruitment of talent with specific skills and interests
- Research collaboration would join the list of most important things, dependent upon accessing funds
- A clear pro-active point of contact is the most important. The other items flow from this!

Q4: What skills would you like to see improved/developed by physics graduates?

Physics/Technical

- Technology and applications skill specific to our products, eg Thermal Heat Transfer. Application notes useful for our customers.
- Model-based verification & uncertainty analysis.
- Design thinking (eg human-centred design), basic to advance theory knowledge
- Practical skills - ability to make things and familiarity with test equipment.
- Good understanding of core physics - experimental design and ability to think critically about setup and results. Introduction to programming, use of languages such as Python, C etc.

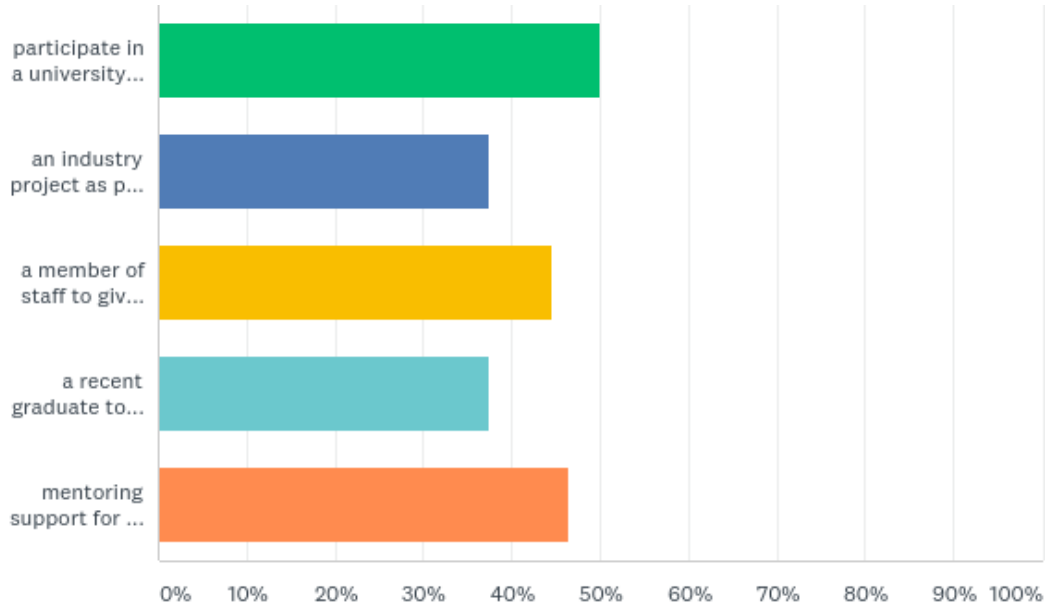
- Numerical software investigations skills are usually very good in physics graduates. A distinct bonus is software engineering skills on top of that, usually via a summer placement, to have had experience with code decomposition, functional design, versioning and testing.
- First rate physics and mathematical skills and the ability to apply these to practical modelling and engineering.
- Some knowledge of the history of their subject, why it is important and how it contributes to industry as a whole.
- Innovative solutions to problem solving based on physics knowledge and previous experience.
- Software experience is very valuable for us. We've noticed this is improving at universities, especially projects using Python.
- Agile methodology, cloud computing
- Applied mathematics
- Coding, data analysis, modelling
- Hands on practical research skills
- Programming skills looking at more real-world issues - scale, data preparation
- Lab skills; application of their theoretical knowledge to real-life problems

Transferable

- Ability to identify a number of approaches to a problem. Self-starting and independence, where a graduate can be given a project and is able to work independently (with guidance) and really take ownership. It is hard to assess these skills at interview unless there is evidence of project work outside of the university course.
- More practical technical skills, more business/commercial skills.
- Communication of science data analysis
- A better understanding of project management
- Commercial skills and use of commercial tools such as Excel. Students are knowledgeable with in-depth analysis tools but not connected to real-world commercial contexts. This has also been highlighted by students.
- Communication and presentation skills.
- Understand how to start a complex problem. Skills for keeping track of tasks
- Ability to communicate technical idea into language for non-tech people.
- Wider thinking. How to look at other areas/industries and cross fertilise
- Functional knowledge is generally very good, it's the soft skills (communication, team working, self-management) that often need to be worked on.
- Transfer of applied skills into the commercial world, innovative thinking
- Customer focus (in preparation for commercial world)
- Physics graduates already have a good number of useful skills. Would be helpful to have a better understanding of business and what drives business (markets, needs) and an appreciation of product development/engineering. So, I do not hear that the hard thing i.e. proofing the concept has been done and now it is "only" engineering. Also that they have an understanding of product cycles and the time involved, from idea to product sold and ...

- Hands on relevant experience to business, taught modules are ok but practical experience putting together a significant experiment or project is very important (ie a big 6 month -12 year project, not just labs or small scale projects). Graduates with this sort of experience are rare.
- To pay attention to detail
- In addition to being 'scientific' most commercial organisations would require their candidates to be commercially minded and have project management skills to back up their specific expertise in physics.
- Ability to take initiative, not just following defined procedures
- Social intelligence and knowing about workplace expectations. Resilience.
- Self-discipline (working hours, report writing...)
- Science communication skills and importance of these skills being highlighted.
- Decision making. A better appreciation of general purpose lab and test equipment. Transferrable skills such as systems thinking
- A widening of their understanding of the kinds of careers that they can go into.
- Business-related so they can apply the theory to the working environment.
- Periods of work experience during studies

Q5: Would you be interested in providing one or more of the following? Tick all that apply:

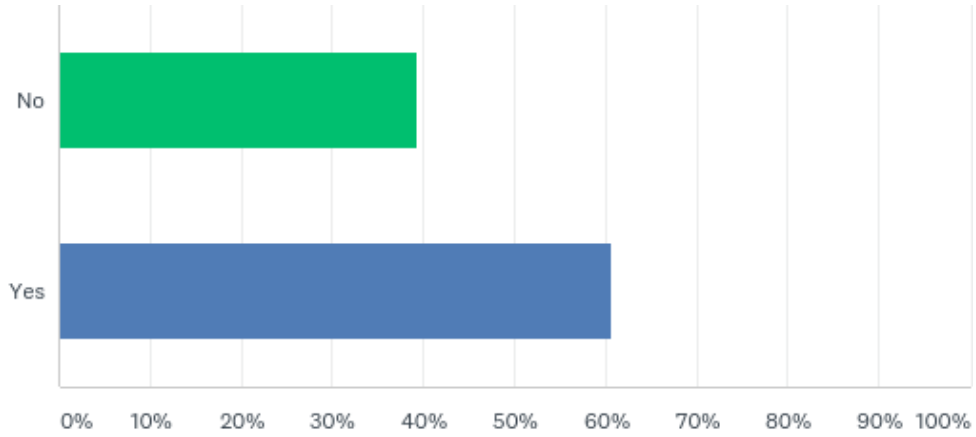


ANSWER CHOICES	RESPONSES	
participate in a university industry panel to input into the physics curriculum	50.00%	28
an industry project as part of a module for physics undergraduates	37.50%	21
a member of staff to give lectures/tutorials on the world of work as a physicist	44.64%	25
a recent graduate to talk about their experience of the transition to work	37.50%	21
mentoring support for a physics undergraduate or PhD	46.43%	26
Total Respondents: 56		

Comments:

- We are starting to put in place a capability for running 6-month projects that form the research element of MSc physics degrees.
- All are possible subject to business requirements and staff availability.
- We do spec computer science projects so that might be relevant.
- Industry projects are valuable but can only be offered when work opportunities arise and as such are more challenging to support
- I would feel under-qualified to tell physicists how to teach physics but could provide insight into what industry values.
- I think we do all of these at some level from time to time.
- We already operate as mentors for PhD in relevant fields and domains
- I would highlight that the balance of benefit of the interaction is biased very heavily to the university/undergraduate. It's easier to commit resources if there are more mutual benefits.

Q6: Have you ever employed a physics PhD graduate?



Comments:

- Attention to detail and listening for development of problem statements, often from under-supported indirect experts.
- A better practical understanding of theoretical implementation would be very beneficial. Also some commercial sense and understanding of industry.
- Self-motivated and ability to learn new areas of applications quickly. Good organisation skills.
- Expert in their field, ability to take ideas from research paper to prototype.
- Someone who can become a senior research member and project lead in future.
- Experimental skills and mathematical/computing skills
- Deep physics skills are always welcomed
- A rigorously analytical mind-set and attention to detail - plus creativity
- An enquiring mind and wanting to make things happen
- Strong technical knowledge in relevant area, self-starter, able to build network.
- Ability to think a problem through, persistence, good range of practical and theoretical skills

- Problem solving, breadth and diversity of skills, persistence but also in-depth knowledge on a key discipline
- Excellent mathematical skills; ability to pick up new research topics very quickly; good numerical coding ability; software skills beyond standard worksheet maths; ability to spec own technical programme of relevance to application; group dynamics
- Ability to apply theories to real world problems and good communications skills.
- Applied science capability - taking data, spotting patterns, building and refining predictive models
- We are a 'high tech' consultancy and target able PhDs to compete with our competitor organisations! We look for high potential and also flexibility as much as specialist knowledge at recruitment.
- Relevant domain knowledge and the ability, disposition and motivation to convert their academic and research expertise into practical product applications at higher level technology levels
- Literate and numerate. Knowledge of and confidence using a broad range of mathematical modelling techniques and solutions. Good logical and analytical thinking skills.
- Reliability and preparedness to work for 8 hours per day.

Q7: Would you be interested in any of the following?

ANSWER CHOICES	RESPONSES	
employing a physics PhD graduate	57.14%	32
offering a short PhD placement	55.36%	31
sharing funding for a PhD student through an industry consortium on a specific research area	33.93%	19
Other (please specify)	21.43%	12
Total Respondents: 56		

Comments:

- I am interested in physics graduates in general, not just PhD candidates.
- As a department we are actively seeking to develop collaborative research opportunities with universities and others.
- Offering internships is always an option for us.