



Annual Review  
2015



# Introduction

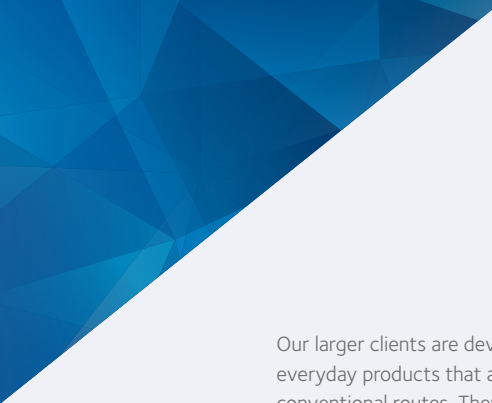
CPI began operations in 2004, and in the eleven years since then we have established a track record of delivering major impact and value for the UK and for our partners.

We have worked with more than 1,000 companies delivering over £350m of projects with an overall benefit to the UK of £2.4bn. We have won more than €150m of European projects allowing UK companies to work with European collaborators to develop and commercialise new products and processes. For every pound of UK taxpayers' money invested in CPI it is estimated that we return £10 to the UK economy.

We are working with companies who are developing novel technologies in diverse fields such as gas fermentation, formulation of personal care products, medical devices, printed sensors, medicines and therapeutics, barrier systems, chemicals, waste, anaerobic digestion and graphene applications.

The start-up and university spin-out companies we work with have been able to raise more than £100m of funding and investment to help them to grow, develop and prove their technologies on the path to commercialisation.





Our larger clients are developing transformative routes to everyday products that are superior and more economical than conventional routes. They work with us because we bring to bear capability that they do not have, reducing their risk and speeding up the process of innovation.

We are able to do this because we understand what it takes to drive innovation. We have looked at our eleven years of experience, of big and small projects alike, and we know what is needed for success. Technology is but one of the elements and we are able to combine diverse technologies with our understanding of the innovation process and deliver value to delighted clients time and time again.

CPI is proud to be one of the founding partners of the Catapult programme. Focused on supporting advanced manufacturing in the UK, CPI is the process industry element of the High Value Manufacturing Catapult.

CPI is also proud to have been the model for the overall Catapult programme and our track record of success and delivery has given Industry and Government the confidence to trust CPI to develop and deliver national capability.

This year we have made some structural changes to our business including the development and appointment of a number of high profile individuals into senior roles within the company and board. These individuals bring with them a wealth of experience from both private and public organisations and will help to drive business opportunities and maximise the company's significant contribution to the UK economy.

I hope you will enjoy reading this review and seeing some of the fantastic things CPI has helped its partners achieve over the past year.



Nigel J Perry FREng FRSC  
Chief Executive Officer



# About CPI

CPI is a technology innovation centre and the process manufacturing arm of the High Value Manufacturing Catapult. CPI works with universities, SMEs and large corporates to help them overcome innovation challenges and bring next generation products and processes to market. Operating across a broad range of technologies, we support our partners at every step of the way; from concept to market; business support to technology development; from scale up to supply chain intervention.

CPI supports a sector which currently exports almost £50bn a year with a contribution in excess of £15bn a year to the UK's Gross Domestic Product. CPI leverages its assets and knowledge, providing significant return on investment which nurtures and supports innovation in this sector. This is imperative if the UK is to compete in a global market place. However, operating within this innovation space is not without risk.

At CPI we understand these risks and have developed the CPI Innovation Integrator® model to support businesses and projects; identifying challenges and opportunities whilst supporting on risk mitigation to prove that new products and processes are viable before moving onto full scale production.

Our dedicated national innovation centres support industrial biotechnology and biorefining, printable electronics, biologics and formulation which in turn underpin major markets such as; healthcare, electronics, food and drink, aerospace, automotive, materials and energy. These state-of-the-art, open access facilities are available for the development, proof of concept and ultimately commercialisation of new products and processes.

Companies who work with CPI are able to use our facilities and work with our highly skilled teams to demonstrate their product or process before investing substantial amounts of money in capital equipment and workforce development.

Utilising our strong networks, we can bring together a range of partners in the delivery of innovation projects. No matter what route our partners take we are here to support them and work towards a common goal of strengthening the UK's competitiveness in High Value Manufacturing.

## Our Values

**Visionary;** We have foresight of how science can help society

---

**Connected;** We collaborate closely in everything we do

---

**Enterprising;** Turning innovation into wealth is our reason for being

---

**Professional;** We deliver on our promises

---

**Inspiring;** Our passion energises those around us

---

**Safety, Health and Environment;** We protect people and our surroundings

## CPI

### Technologies



Industrial Biotechnology  
and Biorefining



Printable Electronics



Formulation



Biologics

### Services

Product and Process Development

Prototyping, Demonstration and Scale Up

Pilot Production

Fuel, Feedstock and Materials Investigation

Manufacturability, Process Modelling and Simulation

Economic Evaluation, Life Cycle Analysis and Process Economics

Identification and Engagement of Key Collaborators

Commercialisation Support and Incubator Space

## Markets



Aerospace, Defence and Security



Automotive and Transport



Built Environment



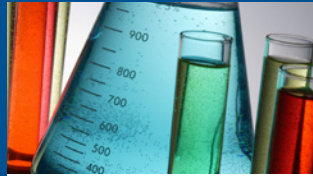
Retail and Consumer Goods



Energy



Food and Drink



Materials and Chemicals



Personal Care



Pharmaceuticals



Electronics and IT



Healthcare and Lifesciences



Environment and Water

# A Proven Approach to Innovation

CPI's specialist expertise have been proven repeatedly, within multiple sectors, from start-ups through to large corporations. We understand exactly what is needed for successful innovation to take place at each technology development stage; invention, innovation and commercialisation. We have codified our approach to innovation and created the CPI Innovation Integrator® model to support our partners on their path to commercialisation.

6

The Innovation Integrator® translates research into the clarity of a commercial business proposition whilst identifying the assets and processes needed to support its development. We have identified eleven key components, which when brought together, enable true and effective innovation. Each component is as important as the next and all must exist for innovation to happen and to enable the success of a value-creating business.

The Innovation Integrator® model:

- Is a diagnostic tool which provides a capability roadmap at each of the technology development stages; invention, innovation and commercialisation.
- Identifies future innovation needs and the capability to support the development of next generation processes, products and services.





- Uses CPI's expert knowledge to assess technologies and business models to systematically advise partners on the potential success of their developments.
  - Can convert inventions and ideas into processes, products or services for everyday use.
  - Helps identify available assets and knowledge so companies can build collaborative partnerships to reduce the risks associated with innovation.
  - Creates networks and partnerships that ensure all of the eleven innovation factors are addressed.
  - Brings direct and indirect members of the supply chain together to deliver innovation to market.
- ...thereby successfully enabling the innovation process.

# CPI Timeline

From building and opening the National Biologics Manufacturing Centre, to helping companies develop, prove and commercialise new products and processes, 2015 has been our most successful year yet. Throughout the year we have worked with SMEs, universities, large corporates and our partners in local and national government to build innovation infrastructure and enable the translation of ideas and concepts into robust manufacturing processes.

Take a look back at our major announcements of the past eighteen months.



2014

June

## CPI celebrates 10th anniversary

CPI hosted a number of events to celebrate its 10th anniversary including a reception at the Palace of Westminster and its first ever conference 'From Innovation to Commercialisation'. The events brought together government, universities and industry to review and evaluate the current status of the UK process manufacturing industries.



2014

July

## Building a Biologics 'Factory of the Future'

CPI announced a new project to enable the development of process technologies and facility designs needed to deliver personalised and stratified medicines. The new facility will allow organisations to develop and test medicine manufacturing technologies that can be directly applied to the supply chain.

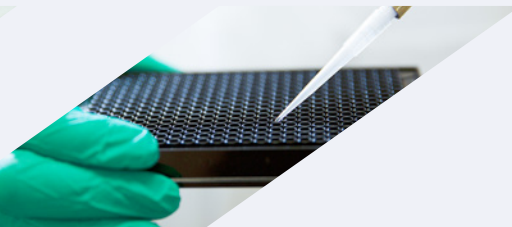


2014

November

## Developing new ways to treat diabetes

CPI is part of a multi partner project to manufacture insulin coated gold nanoparticles for use in an oral delivery patch. The delivery patch is a non-invasive, needle free drug delivery mechanism which allows nanopharmaceuticals to be administered to the patient via a polymer strip which is applied inside the mouth.





2014  
December

## The National Formulation Centre

CPI announced a new open-access innovation centre for advanced formulated product design and manufacture. From food, to fuels and medicines, formulated products are vital to our everyday lives. The new centre will provide the environment for companies to increase productivity and accelerate the commercialisation of their next generation formulated products.



2015  
January

## Transforming waste into worth

CPI is leading a European collaboration to transform biogas generated through the anaerobic digestion of food waste into high value graphitic carbon - a form of graphene - and renewable hydrogen. CPI will utilise research and specialist industrial process engineering to optimise the quality and economic value of the graphene and hydrogen.

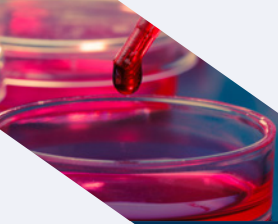


2015  
February

## Using light for healthcare

CPI will establish and manage a new open-access facility for SMEs, academia and industry to accelerate the commercialisation of new photonic healthcare products. Light can be used to diagnose and treat medical conditions and illnesses ranging from wound, skin and cancer care to niche applications in neurology and ophthalmology.





2015  
March

## UK biotech consortium strengthens supply chain

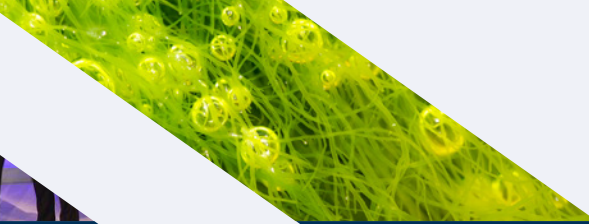
The consortium will adopt leading-edge technologies emerging from UK SMEs to target critical points in the biologics supply chain. The intended outcome is to reduce the time it takes to bring biopharmaceuticals to market by increasing the industry's ability to identify failing drugs earlier in development.



2015  
April

## CPI wins Not for Profit Organisation of the Year Award

Judged by a panel of independent adjudicators, CPI fought off stiff competition to win Not for Profit Organisation of the Year at the 2015 North East Business Awards. The awards recognise the entrepreneurial drive, innovation, financial acumen and ambition that characterises the region's dynamic business environment.



2015  
August

## Producing bio-energy from seaweed

CPI is leading a collaborative project to develop a process that uses seaweed in the generation of sustainable energy. The project will use seaweed as an alternative feedstock for anaerobic digestion processes, thereby limiting the use of prime agricultural land that could be used for growing food crops.





2015

August

## TerraVerdae scales up bioplastics process

Working with CPI, TerraVerdae has successfully scaled-up its biodegradable and biocompatible materials technology. The process has been developed from the laboratory through to pilot scale demonstration, validating process scale up and production economics for commercial deployment.

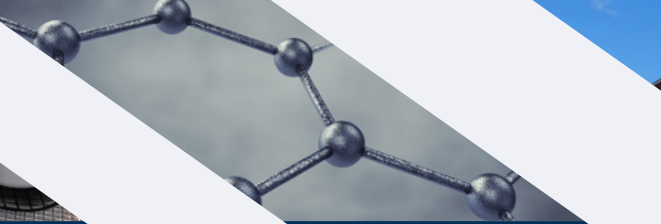


2015

August

## Commercialising intelligent packaging for pharmaceuticals

CPI is part of a UK based consortium developing intelligent packaging for the pharmaceutical industry. Smart packaging can improve patient outcomes and compliance whilst providing information and validation around anti-counterfeiting, product tampering, logistics and stock control within the product life cycle.

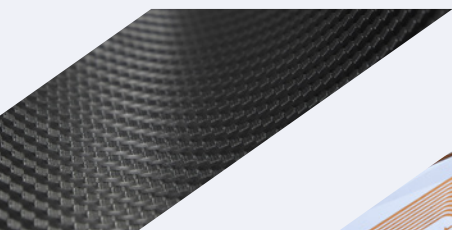


2015

August

## A graphene coated self-cleaning membrane filter

CPI is part of a collaborative project which will develop a low cost, self-cleaning graphene based coating technology. Once applied to industrial membranes, the coating makes them highly resistant to fouling. The coating will be formulated and validated for deployment in a number of applications including desalination, oil and water separation and nuclear waste water treatment.





2015

September

## Opening the National Biologics Manufacturing Centre

CPI launched the new £38m Centre which helps companies to develop, prove and commercialise new and improved process technologies. Biologics are delivering significant advances in healthcare with completely new medicines being developed for serious illnesses, including cancer, blood conditions, auto-immune disorders and neurological disorders like multiple sclerosis.



2015

December

## Supporting innovation in the UK Metals industry

CPI is running an innovation support programme aimed specifically at SMEs operating across the UK Metals processing supply chain. The programme will enable companies to respond to the changing business environment caused by the recent downturn in the steel sector.




Read more at [www.uk-cpi.com/news/](http://www.uk-cpi.com/news/)

# Printable Electronics

The CPI Printable Electronics Centre focuses on the integration and manufacture of new innovative electronic devices, developing the technologies that will drive the manufacturing process forward. These new products and processes, including the printing of electronic

functionality open up a host of design opportunities and will lead to the creation of a range of future electronic applications in key markets such as print and packaging, healthcare, built environment, automotive and aerospace.

2015 has been a year of continued progress. We have continued to develop our work with SMEs and there are now four such companies located within our printable electronics centre; PragmatIC Printing, SmartKem, Polar OLED and NeuDrive.



*Printable electronics applications include solar cells, batteries, sensors, lighting products, medical diagnostic devices, novel drug delivery devices, smart packaging, clothing, and displays.*



In addition, CPI continues to work closely with PolyPhotonix. They have continued to develop their medical business, using light-based therapies for the treatment of conditions such as diabetic retinopathy. Their first product in this area, the Noctura 400 eye mask, has now entered the commercial market. They also continue to focus on their core light technology developments and have now established their own independent office and laboratory facility.

This year we have further strengthened our ability to protect devices containing environmentally sensitive materials through the installation of two atomic layer deposition tools from Beneq. This gives CPI the capability to produce 'barrier' films that can protect materials in devices that would otherwise be degraded by their environment.

We have also installed a roll-to-roll printing and encapsulation line which complements existing sheet-based batch production at CPI. In addition, we have acquired the digital prototyping assets of CIT Technology Limited and its associated licences and know-how. This will allow CPI to produce prototype

flexible substrates rapidly for applications such as printed antennae, sensors, electrodes and flexible PCBs.

The focus in 2016 will be the development of the National Centre for Healthcare Photonics. The use of light in imaging, diagnosis, treatment, point of care instrumentation and surgery offers huge potential for the global healthcare sector. Another focus area will be 'Emerging Electronics', the ability to integrate conventional electronics with printable electronics successfully and we will be significantly enhancing our capability in this area.



# Industrial Biotechnology and Biorefining

*CPI's Industrial Biotechnology and Biorefining centre remains a unique and critical component of the UK process industry's response to the opportunities and challenges in realising the benefits of a 21<sup>st</sup> Century bioeconomy.*


Utilising our state of the art facilities and technical expertise, we help our clients to de-risk process development. This is achieved through proof of concept testing to accelerate the commercialisation of new products and process technologies.

Our collaborations in 2015 have delivered real progress in the translation of fundamental research through to pilot scale and supported

many of our partners on their journey to commercial operations. We have completed projects ranging from the production of PHA based bio materials, to improved pathways to molecules for food flavouring, and the continuous production of metabolites from a combined biological and chemical process.

In 2015 we have welcomed new colleagues with skills in fermentation science, anaerobic digestion, process engineering and computational fluid dynamics as well as strengthening our project management and leadership team to reflect the scale of current operations. The skills of our plant operations team underpin the translation capability that we offer, de-risking the transition to higher technology readiness levels, building confidence at pilot plant scale and producing high quality samples for market testing.

We continue to keep pace with the direction of UK and EU research, and our C1 gas



fermentation facility became fully operational in 2015, running experiments for partners and enabling gas fed fermentation process development up to 10L scale. We continue to invest in our industrial biotechnology plants, including our anaerobic digestion facility which now has 8x5L digestion systems with automated feeding and continuous biogas measurement capability.

Our record of both leading and supporting key programmes of collaborative research and development continues to be a vital and exciting pillar of our delivery strategy. At the conclusion of Round 1 and 2 of the BBSRC IB Catalyst funding programme, CPI had secured in excess of £3 million of

supported funding; with plans to take part in future rounds. Our European projects also provide a key role in broadening our appreciation of larger scale collaborations, and we are proud of the contribution that we have made in developments to produce fuels from macro algae.

*The European bioeconomy  
is estimated to be worth €2 trillion  
and employs 19 million  
EU citizens.*

# Biologics

This year has been a very important year for CPI. After almost three years of planning and construction we officially opened the National Biologics Manufacturing Centre in September. The £38m investment is the result of the government's 'Strategy for UK Life Sciences' which was published in 2011. The report, which was released by the Department for Business, Innovation and Skills, outlined a vision for the UK to become a global leader in the life sciences sector. Through the investment in the new centre and the expertise of our team, CPI is now delivering this vision.

CPI provides companies with open access facilities and expertise to help develop, prove and commercialise new and improved processes and technologies for the manufacture of biologics.

Biologics are medicines produced through biotechnology which represent the cutting-edge of biomedical research. They are delivering significant advances in healthcare with completely new medicines being developed for serious illnesses, including cancer, blood conditions, auto-immune disorders such as rheumatoid arthritis, and neurological disorders like multiple sclerosis. The use of biotechnology can also facilitate the development of the next generation of personalised medicines for specific diseases and patient groups. With a focus on the development and





*The Centre will significantly increase the UK's manufacturing capability in biologics and strengthen the UK's position as the location of choice for life science companies*

integration of improved process and analytical technologies as well as formulation, fill and finish. The new centre has been fully equipped to meet the needs of the industry.

CPI has been working on projects within the sector since 2011. In 2015 we have worked with companies such as Midatech, UCB Celltech, Lonza Biologics, Sphere Fluidics and Horizon Discovery to name a few. One of the projects which was completed in 2015 was a

collaboration with Arecor which investigated ways to enhance the compatibility of biologic medicines with drug product containers.

The ability to stabilise therapeutic proteins using formulation, which was demonstrated during this project, can provide great benefit to the global biologics manufacturing supply chain by cutting costs and reducing waste through increased shelf life and reduced product specification failures.

2016 will see CPI's profile grow within the sector as we expand our project pipeline, forming partnerships with both new and existing customers. We will also be concentrating heavily on the planning and construction of the Biotherapeutics Factory of the Future which is due for completion in 2018. The new centre will specifically focus on innovative manufacturing techniques for the production of biopharmaceuticals.


# Formulation

2015 has seen the creation and establishment of the National Formulation Centre, through which CPI will support and develop innovation in formulation science. We are providing the platform for UK companies to bring new, high value innovations to market years ahead of competitors.

Formulated products are all around us and vital to our everyday lives, from the food we eat, to the household cleaning products we use, to the oils in our cars, to the paints we use to decorate our homes and the pharmaceuticals that we use to maintain our health.

Effective formulation directly impacts product performance and influences key product features such as stability, delivery of active components and sensory perception.

The National Formulation Centre is unique and is driving a step-change in the way formulated products are designed and manufactured.



*The new National Formulations centre will operate a 'hub and spoke' model bringing together the existing knowledge base of the UK formulation sector*

The Centre is focused on solving key challenges for industry and we are working with global market leaders to do so.

These challenges are:

- Predictive design to accelerate product development
- Manufacturability to increase cost productivity
- Data acquisition, analysis and modelling to quantify and codify the art of formulation

The Centre has a physical location with open access facilities based at NETPark in Co. Durham and a broader multi-partner network spanning key knowledge partners and SME innovation enablers. Our industry led approach focuses on the “what’s needed” and couples it with the “what’s possible” in formulation design and manufacture.

Looking forward to 2016 we will see the fruition of our recent project activation sessions which are bringing together both industrial players and knowledge partners across the UK in order to clarify the key industrial needs and the current technology

barriers associated with the development of new formulation technologies. The workshops are being held across the UK and will enable us to activate industry-led capability build projects which will be delivered by CPI and our partners. These new projects will deliver open access capability in the predictive design and manufacturability of formulated products.



# Working with SMEs

Over 50% of CPI's work is carried out with SME partners. We help SMEs to identify and overcome their innovation challenges by providing technical expertise coupled with development and scale up facilities. We help these companies to understand the commercial feasibility of their new product or process in a phased way that reduces their risk and the risk for their investors whilst enabling them to eliminate non core processes letting them focus on what they do best.





*“CPI’s extensive resources and support have enabled us to grow at an accelerated pace, faster than is usually possible for a start up. Quite honestly, without CPI we wouldn’t be here – that’s the bottom line.”*

– Richard Kirk, PolyPhotonix

*“Working with CPI has enabled us to reduce the risk of moving from lab to production scale by utilising CPI’s process facilities and expertise before making a significant capital investment in our own facility.”*

– Dr Eric Whale, CelluComp

POLYPHOTONIX

CelluComp  
sustainable materials

nuformix

NeuDrive

SmartKem

plaxica

m  
MIBATECH PHARMA

Arecor

TerraVerdae  
bioworks



PEL  
Printed Electronics Ltd



COHDA™



PEACOCKS  
The Caring Company

SANKO GOSEI

Fiberight

MICRO-CHEM

AlgiPharma



ReBio

# Working with Universities and Spin-Outs

We work with both universities and their spin-outs to translate research concepts and inventions into the language, processes and systems of the manufacturing sector. We help to build proof of concept and process scale-up projects to demonstrate that new ideas are commercially viable before moving into the market. In addition, CPI sits on steering groups and advisory boards for projects, centres for doctoral training, centres for innovative manufacturing and other bodies to assist in steering the direction of research to value creating activities.

*“ Working with CPI has saved us at least 18 months and capital investment in the order of £10-20 million. ”*

– **Richard Price**, PragmatIC Printing

*“ CPI played a fundamental role in getting us to our current position. This was essential to get us the sufficient credibility to attract financial investment. ”*

– **Jon Mabbitt**, Applied Graphene Materials



# Working with Large Corporates

We help our corporate partners to bring products, processes and services to market faster. We do this by helping them to prove that their new products and processes are commercially viable before making substantial investments. Whether working on a specific project, or as part of a multi-partner collaboration, we aim to stimulate growth and productivity in companies by integrating innovation capabilities from different sources to accelerate the pace and reduce the risk of new product and process development, in turn making the UK an attractive place to invest and do business.



*“ The clear benefit to GSK of working with CPI is that we are able to concentrate on our strengths and have a partner explore areas where we are more limited. ”*

– Ted Chapman, GlaxoSmithKline

*“ CPI offer both exceptional facilities and people and have delivered structured and insightful projects that have helped us get to the heart of some of the process challenges we have faced. We have built a great relationship with the teams and are looking forward to further collaboration.*

– Tim Finnegan, Quorn



CRODA



TATA STEEL



P&G



SIEMENS



# Working with Government

CPI builds and manages national innovation assets to help the UK retain and grow its global competitive position. By enabling the best of innovative British companies to maximise their potential we seek to increase the economic contribution made by technological breakthroughs. CPI is a founding member of the High Value Manufacturing Catapult, the government's flagship programme to promote the translation of new ideas into profitable, commercial business. Through this partnership we work with Innovate UK, the public sector and industry to define the challenges, themes and assets required to provide a competitive innovation environment in the UK.

*“ Today’s conference demonstrates the importance of innovation to our manufacturing industry. Through the Catapult network we are showing that Government and business must work together in partnership to support innovation. ”*

– Then Business Secretary **Vince Cable** speaking at the CPI Industry Conference

*“ Thanks to the Catapult network, and the progress made by Innovate UK through its various programmes, we now have the innovation infrastructure capable of helping us scale up our public and business investment. ”*

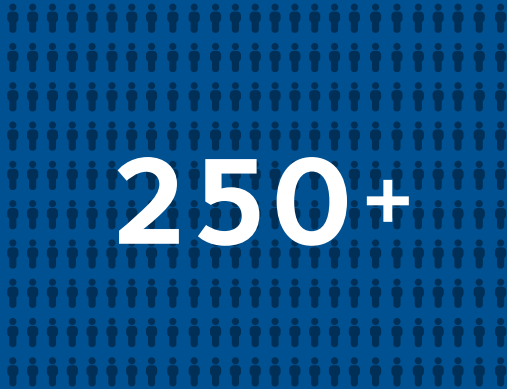
– HM Treasury and Department for Business, Innovation and Skills – Our Plan for Growth: Science and Innovation

29



# Facts and Figures

250+



We have over 250 fully trained employees at CPI

66% of employees have a BA/BSc

27% of employees have a PhD

7% of employees have an MBA

 x 500

To date CPI has successfully completed over 500 public and private projects with over 350 partners

50% were Small and Medium Enterprises

31% were Large Corporate

19% were Academia



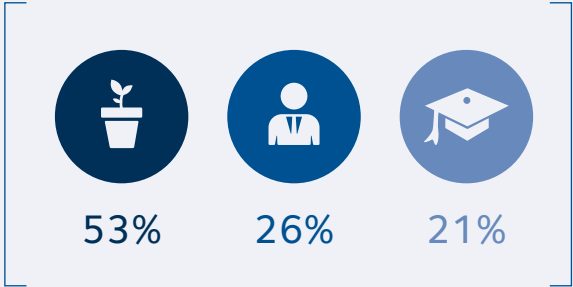
# Turnover



# Engagement

- Small and Medium Enterprises
- Large Corporate
- Academia

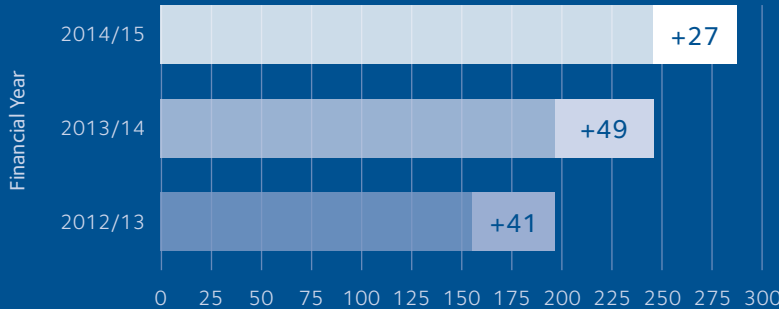
53% of companies we engaged with in 2014/15 are SMEs.



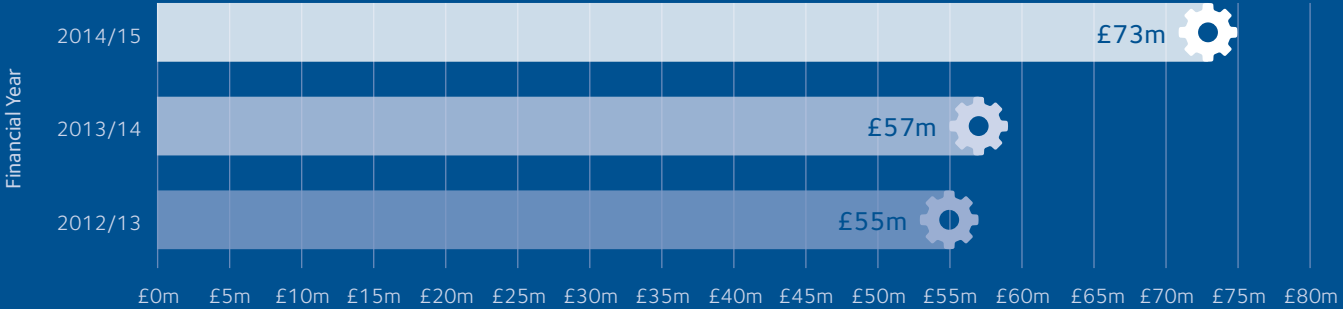


We are working with **37** universities throughout the UK and Ireland

# Employee Growth



# Asset Growth



We work with  
**Innovate UK**

**CATAPULT**  
High Value Manufacturing



Phone: +44 1642 455 340  
Email: [info@uk-cpi.com](mailto:info@uk-cpi.com)  
Web: [www.uk-cpi.com](http://www.uk-cpi.com)

Centre for Process Innovation  
Wilton Centre, Wilton,  
Redcar, Cleveland,  
United Kingdom, TS10 4RF