UK agriculture badly needs an "industrial revolution" of its own. We need to be creative and radical and we need to adopt new technologies and move towards increased automation today, not tomorrow. This is because productivity in UK farming over the past 30 years is low and has been accompanied by a 1% per year decline in UK self-sufficiency in food.

To tackle this, the Government has invested £68 million in four agri-tech Centres, all with the same vision. CHAP, CIEL (Centre of Innovation Excellence in Livestock), AgriEpi (Agricultural Engineering Precision Innovation Centre) and Agrimetrix (Data Centre) want to bring all members of our agri-food industry together, to drive technology innovation as the way to achieve step-change improvements in our farming productivity.

CHAP (Crop Health & Protection) has been set up to do what it says on the tin – that is to revolutionise how farmers manage crop threats, including pests and diseases, both in the UK and overseas.

CHAP has 11 Founder Partners, made up of industry players and research institutions and, together, it aims to develop, adopt and exploit new agri-technologies and practices. We ask 'what is the need' and we answer that question by pulling technologies from the lab to the farm and through the supply chain.

The fact is that climate change and a range of other factors, including an anticipated population growth (50 billion by 2050) and the degradation of ecosystems is making it increasingly difficult to meet the global demand for food in a sustainable way. To feed the growing world population we must increase our crop yields and this, in turn, will mean that we need to make significant progress in both fundamental and applied science of plants, microbes and soils, including protection from economically damaging pests, pathogens and weeds.

CHAP Chairman and Herefordshire farmer, John Chinn, said

Technology innovation is the way to achieve real step-change improvements that can make the difference between being a cottage industry and a global leader. The future is not just about driverless tractors, automation and robotics. I suggest that by 2030:

- It will be unacceptable to use a prophylactic spray across the whole of a field. We will rely on targeted agrochemical applications applied on a reactive basis.
- The norm, even for vegetable production, will be to till or min till farming. This will improve soil health and protect against soil erosion and dirty water run-off.

CHAP has received £21.3m to invest, on behalf of the government, in infrastructure to support the delivery of research which can be adopted directly into the field. These exciting new facilities are now either ready for use, or will be available by the Spring of 2018.

Here you can see that the new E-Flows mesocosm, the biggest of its kind in Europe, is currently being built in Sand Hutton, near York. This facility is the first of its kind to provide fully flow through streams that can receive chemicals at the treatment rates predicted to occur in the environment, providing the ability to reproduce the expected field exposure accurately.

CHAP's SMART Decision Support Unit uses the latest technology to forecast current and impending risks from pathogens and pests across the UK. This rapid feedback (using an App) on the prevalence and susceptibility of biotic threats during the growing season would reduce uncertainty for farmers and help guide treatment decisions, improving economic efficiency and mitigating the risks from pesticide resistance development. Thirty research quality weather stations have been deployed across the UK for field trials, including untreated plots of four to five varieties of oil seed rape, barley and wheat. Spore traps are being used daily to determine what spores are around throughout the year.

CHAP has built a brand new soil health facility at Cranfield University. This state-of-the-art unit offers real time environmental simulation of soil implements, soil-human and soil-plant water interactions in controllable test facilities. It will give the farmers a better understanding of the role of tillage (from intensive through to no-till systems), drilling, plant establishment, crop development, harvest operations and post-harvest soil management on soil health. Uniquely, the facilities allow for crop cycles to be investigated and thereby capture the longer-term dynamics.

CHAP has invested in four mobile laboratories. On board these trailers, farmers can access a simple 20-minute test which can tell whether septoria is present on wheat and another to detect non-target site herbicide resistance in black grass (Alopecurus myosuroides). These trailers can go straight into the field and give farmers the tools, technology and training needed to combat pests and diseases, using the latest technologies.

So, there is plenty going on and this is just the start. CHAP's USP is a focus on collaboration and we are open to all. So, we encourage anyone who has an interest to get in touch. You might like to take part in one of our workshops to identity priorities and project ideas which can lead to exciting new technologies for the future. Or, if you have a project idea of your own, but don’t have the collective expertise to develop it, we invite you to call upon our team to turn a nugget of an idea into reality. We have many capabilities and services which you can make use of and we urge you to find out more by going to our website www.chapsolutions.co.uk.

Contact enquiries@chapsolutions.co.uk for more information.

Cobrey Farms is a family partnership of John Chinn, his wife Gay and their sons Henry and Christopher. The partnerships owns 500 ha (1256 acres) near Ross-on-Wye and, in addition, rents/manages in excess of 900 ha (2,250 acres) around Herefordshire, Gloucestershire, Monmouthshire, Norfolk and Suffolk. Production encompasses asparagus, blueberries, potatoes, green beans, rhubarb, commodity crops, broiler chickens and a small vineyard.

Figure 1. Total factor productivity in agriculture for selected countries relative to the United States 1996 level (indexed).

Figure 2. CHAP and its 11 Founder Partners.

Figure 3. Construction of the E-Flows mesocosm.

Figure 4. Brand new soil health facility at Cranfield University.

Figure 5. One of four mobile laboratories.