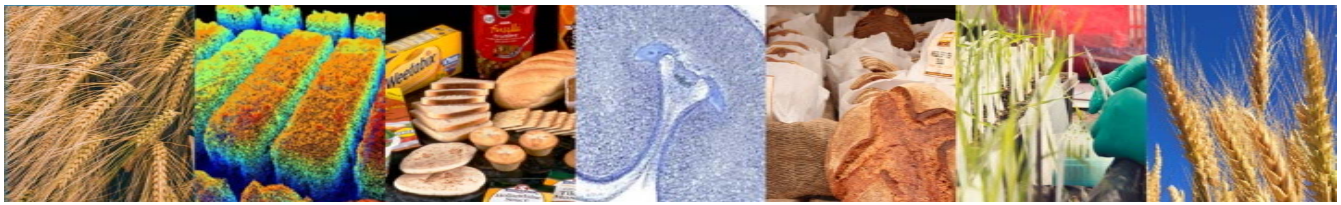
Designing Future Wheat

A Coordinated UK Wheat Programme

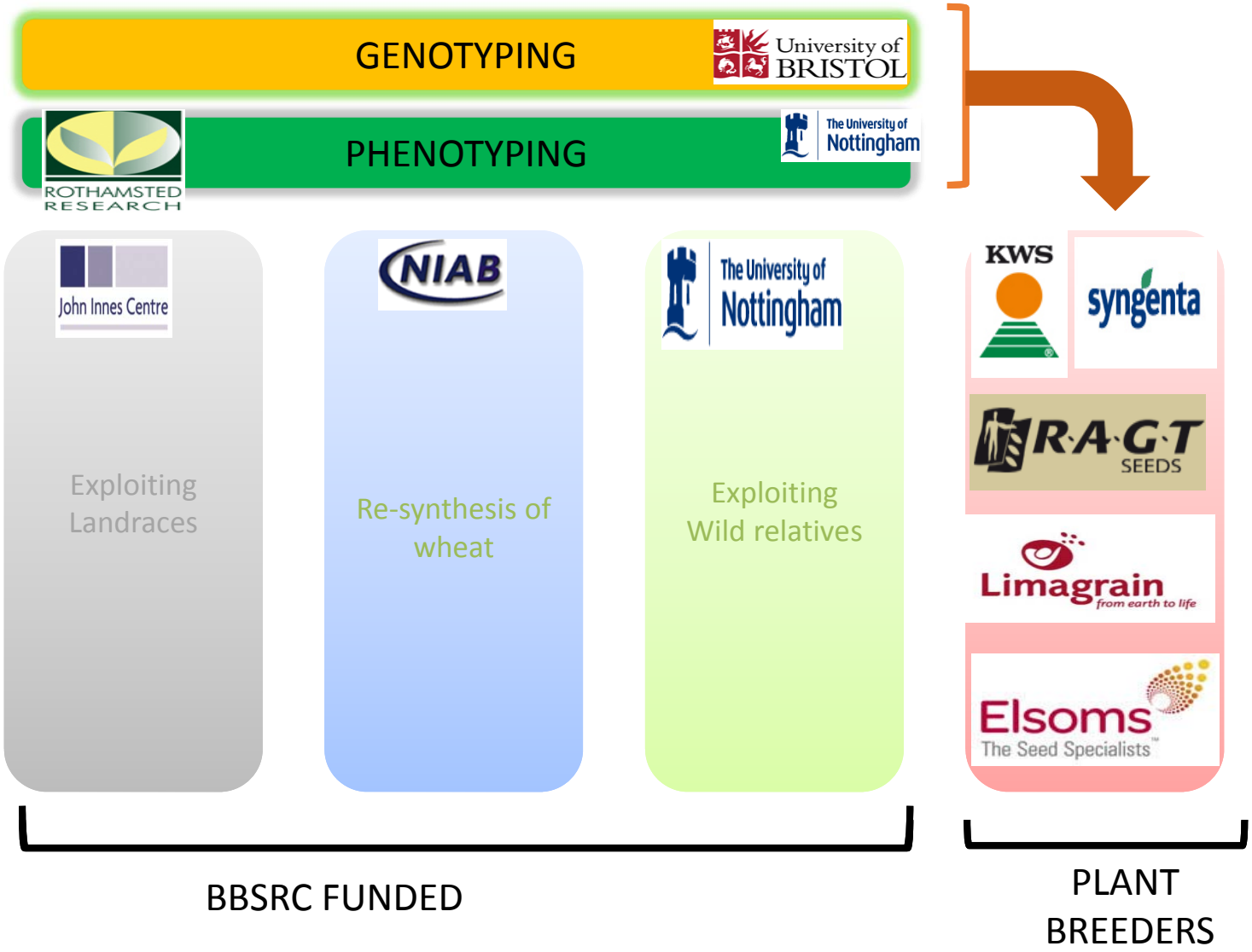
Funded in April 2017



Wheat breeding only exploits 10% of the diversity available

Wheat Pre-breeding Activity

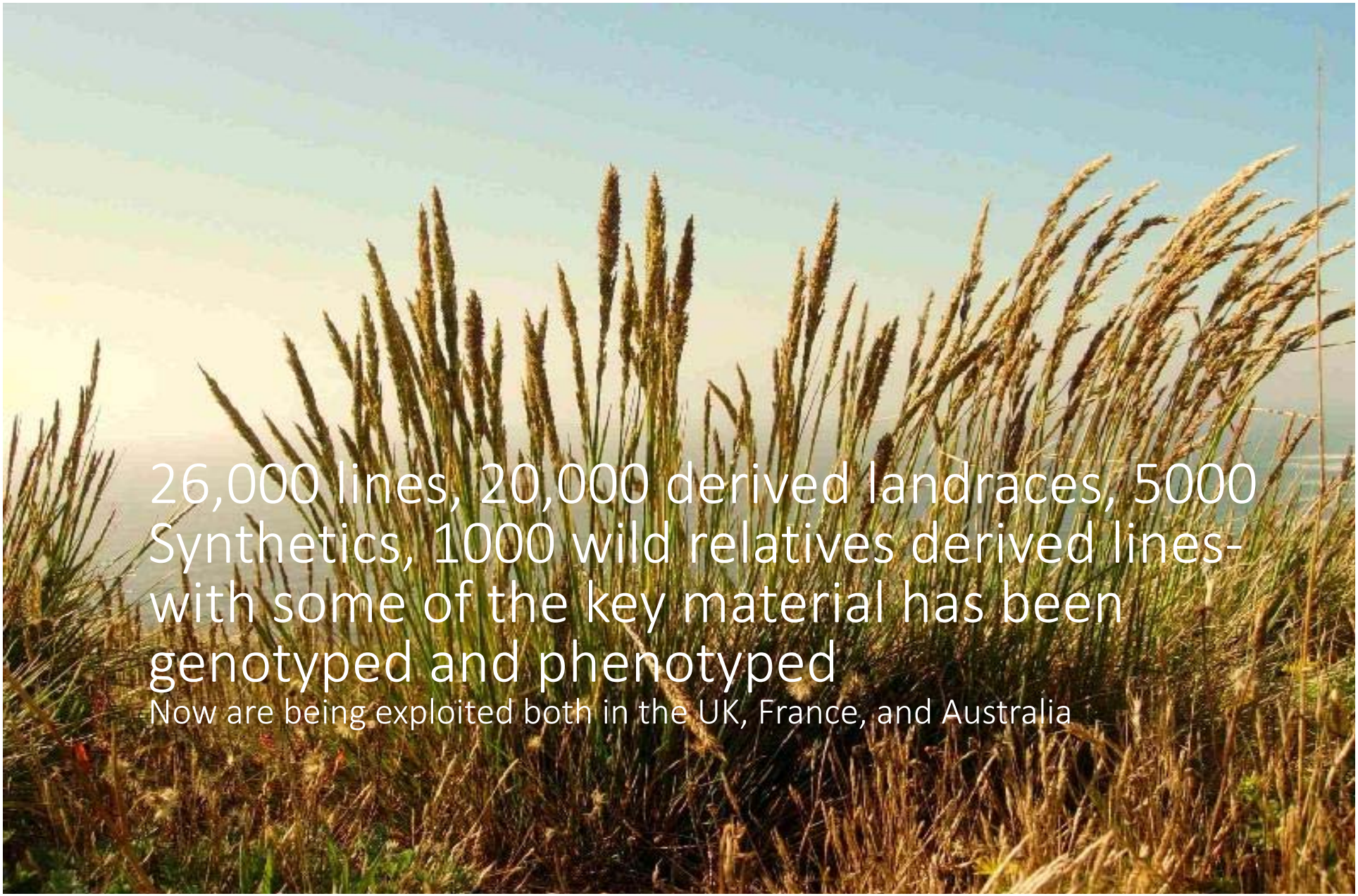
Funded 8 groups at £15m over 6 years



Parental line, crosses made- decisions made in conjunction with private sector breeders

The germplasm is free of IP in line with International Treaty on Plant Genetic Resources for Food and Agriculture

WISP: This wheat pre-breeding programme generated



Background to Designing Future Wheat

- BBSRC asked that the programme be expanded from WISP involving 8 groups, to a larger programme.
- Following consultation, it was thought the programme should support trait dissection exploiting the WISP germplasm , further germplasm development, data access (free of IP restrictions), in fact in now involves 25 PIs in BBSRC funded institutes, and 12 PIs in universities and other institutes.

Designing Future Wheat

DFW

ROTHAMSTED RESEARCH

Earlham Institute

ISP Leader Deputy

Programme manager
Julie Ellwood

WP3: Germplasm
WP leader: Simon Griffiths (JIC)

- Topic 3.1 Germplasm base
- Topic 3.2 Deployment

WP1: Increased efficiency and sustainability
WP leader: Malcolm Hawkesford (RRes)

- Topic 1.1 Optimizing ideotypes
- Topic 1.2 Enhancing resource use

WP2: Added value and resilience
WP leader: Cristobal Uauy (JIC)

- Topic 2.1 Enhanced health benefits
- Topic 2.2 Durable resistance to pathogens and pests

WP4: Data access and analysis
WP lead: Robert Davey (EI)

- Topic 4.1 Genomic resources
- Topic 4.2 Open data framework

Quadram Institute

EMBL-EBI

John Innes Centre

NIAB

University of BRISTOL

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

Trait Work Packages

WP1: Increased efficiency and sustainability

WP Leaders

Malcolm Hawkesford (RRes)

Coordinators

Scott Boden (JIC)

Optimizing ideotypes

- Resilience to heat
- Canopy and height
- Grain number and size

Resource use efficiency

- Soil/root interactions
- NUE
- Innovative technology-phenotyping

RRes	**Phillips** **Thomas** **Semenov** **Hawkesford**	**Hawkesford** **Whalley**
JIC	**Griffiths** **Boden** **Uauy**	**Griffiths** **Moore** **Bentley (NIAB)** **Mooney/Bennett (Nottingham)**

WP2: Added value and resilience

Cristobal Uauy (JIC)

Peter Shewry (RRes)

Kim Hammond-Kosack (RRes)

Safe, reliable and healthy grain

- Composition and health-starch-Fibre-Zinc and Iron

Durable resistance to pathogens and pests

- Durable resistance
- Pathogen biology (rusts, Septoria, Fusarium, take-all, mildew, eyespot; aphids)

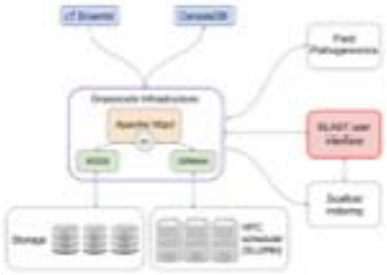
RRes	**Shewry** **Lovegrove** **Hawkesford**	**Hammond-Kosack** **Kanyuka**
JIC	**Trafford (NIAB)** **Hazzard (Quadram)** **Uauy**	**Wulff** **Saunders** **Nicholson** **Uauy**

Data Access routes

DFW partners

COPO

https://copo-project.org



https://grassroots.tools

University of BRISTOL

EMBL-EBI

ROTHAMSTED RESEARCH

DFW data portal

UK CYVERSE™

https://cyverseuk.org

Earlham Institute

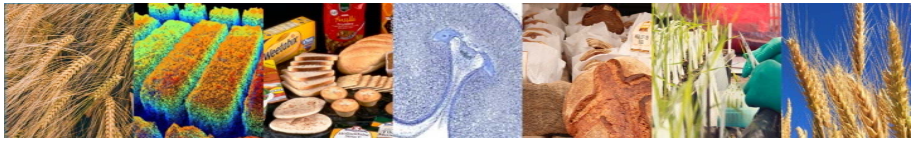
Designing Future Wheat

Pathways to impact

- Peter Shewry (RRes) and Simon Griffiths(JIC) lead on Pathways to Impact.
- Keith Edwards (Bristol), Cristobal Uauy (JIC), Alison Bentley (NIAB) and Simon Griffiths (JIC) met with 9 breeding companies.
  - Meeting outcome was showcase toolkit of 96 premium pre-breeding lines (and associated information) concept, refreshed each year, similar to the national list.
  - Prebreeding germplasm will be freely available free of IP restriction.
  - This further refines the successful toolkit concept developed in the BBSRC WISP programme, which was also free of IP restrictions.

Designing Future Wheat

- The programme brings a focus for links with industry.
- Training will be offered:
  - Over 70 post graduate students associated with the programme.
  - Annual courses open to the wider community (for example wheat genetics).
  - Undergraduate summer students.
  - School activities.



Designing Future Wheat

International links

- G20 wheat initiative (maps onto 7 of the 10 Working Groups).
- IWYP (5 funded projects).
- CIMMYT/ICARDA.
- INRA BreedWheat (France)..
- EMBRAPA initiative (3 funded link projects to WP2).
- Australia (GRDC).
- India (Newton Fund).
- *Bill and Melinda Gates Foundation.*
- *ProWeizen (Germany).*
- *TCAP (US).*