Supplementary Table S1. Resources supporting IWYP and HeDWIC Hubs. Both platforms are located in a major wheat agro-ecosystem in NW Mexico, and are supported by infrastructure of the International Maize and Wheat Improvement Centre (CIMMYT), a large interdisciplinary team of international collaborators (e.g., see links under Human Capital below), and a number of funding agencies who are acknowledged at the end of this review.

Supporting Resource	**Description**
Germplasm	Germplasm is readily available for collaborators via the International Wheat Improvement Network (IWIN), coordinated by CIMMYT's Global Wheat Program (see below), and from the World Wheat Collection (WWC) housed at CIMMYT. The IWIN develops and distributes annually around 1,000 new high and stable yielding, disease resistant genotypes to public and private wheat breeding programs in ~90 countries worldwide (Fig 2). The WWC houses over 140,000 accessions including landraces, wild wheat progenitors, products of interspecific hybridization with progenitors (Ortiz *et al.*, 2008), including over 2,000 primary synthetic lines (Trethowan and Mujeeb-Kazi, 2008); and lines from current and historical nurseries spanning nearly 50 years, aimed at 12 different mega-environments worldwide (Figure 2). In addition, many well phenotyped and genotyped research populations and panels are available for collaborative research.
Experimental field facilities for simulating a wide range of spring wheat target environments	CIMMYT's main wheat research and breeding station is located in the Sonoran desert in the heart of Mexico's breadbasket; conditions are representative of most high yield, irrigated spring-wheat environments globally (Braun et al., 2010). Through irrigation management, water profiles of the predominant drought environments worldwide can be simulated, while a range of heat profiles can also be managed through adjusting sowing dates. Other CIMMYT field stations are available in Mexico for off-season generation advance, and for disease screening. For the evaluation of traits that cannot be screened in Mexico, an international network of precision field-based phenotyping platforms (http://wheat.org) has been developed under the CRP-WHEAT, with co-investment and co-participation of national agricultural research institutes locally. Each platform generates data on prioritized traits at selected locations, such as hotspots for specific diseases and future climate analogue sites.

International Wheat Improvement Network (IWIN)	IWIN is a highly successful breeding and delivery mechanism that has had massive impacts globally, contributing traits to at least half of the wheat grown globally (Reynolds *et al.*, 2017*a*). The combined inputs of IWIN and research hubs like IWYP and HEDWIC guarantee development and delivery of higher yielding and/or climate resilient cultivars with a full package of necessary agronomic traits that can be rapidly adopted by farmers worldwide and/or as new sources of traits for crossing by IWIN co-operators. The IWIN is also a research tool. Since its inception a database of ~20 million yield and other agronomic data points have been amassed. The information generated by IWIN is used to inform more strategic crossing as well as to better define target breeding environments (Braun *et al.*, 2010; Gourdji *et al.*, 2013).
Phenotyping facilities and instruments	Phenotyping facilities and instruments are available for above and below ground growth analysis, measuring photosynthesis, respiration and related traits, as well as state-of-the-art high-throughput field-based phenotyping platforms with thermal imaging and spectral radiometry.
Laboratory facilities	Laboratory facilities are available for processing experimental samples, tissue analysis, DNA and metabolite extraction, genotyping, *etc*.
Data management	Data management resources include internal database systems that facilitate the storage and utilization of millions of wheat germplasm records and associated pedigrees for CIMMYT breeding materials and Germplasm Bank (WWC) accessions, as well as trial and nursery information, and genotypic data. CIMMYT also works to provide FAIR public access to research data and information products through local installations of widely used repositories including Dataverse and DSpace in addition to enabling the exploration of wheat datasets generated by CIMMYT, IWYP project members, and other collaborators through the Germinate database developed by the James Hutton Institute.
Human capital	CIMMYT scientists and collaborators (e.g., http://iwyp.org/; https://www.hedwic.org/) span disciplines from genomics to socio-economics and represent most countries with agricultural economies. CIMMYT also counts on a team of highly experienced technical support staff.