GIGA Project

Options for managing characterization and evaluation data

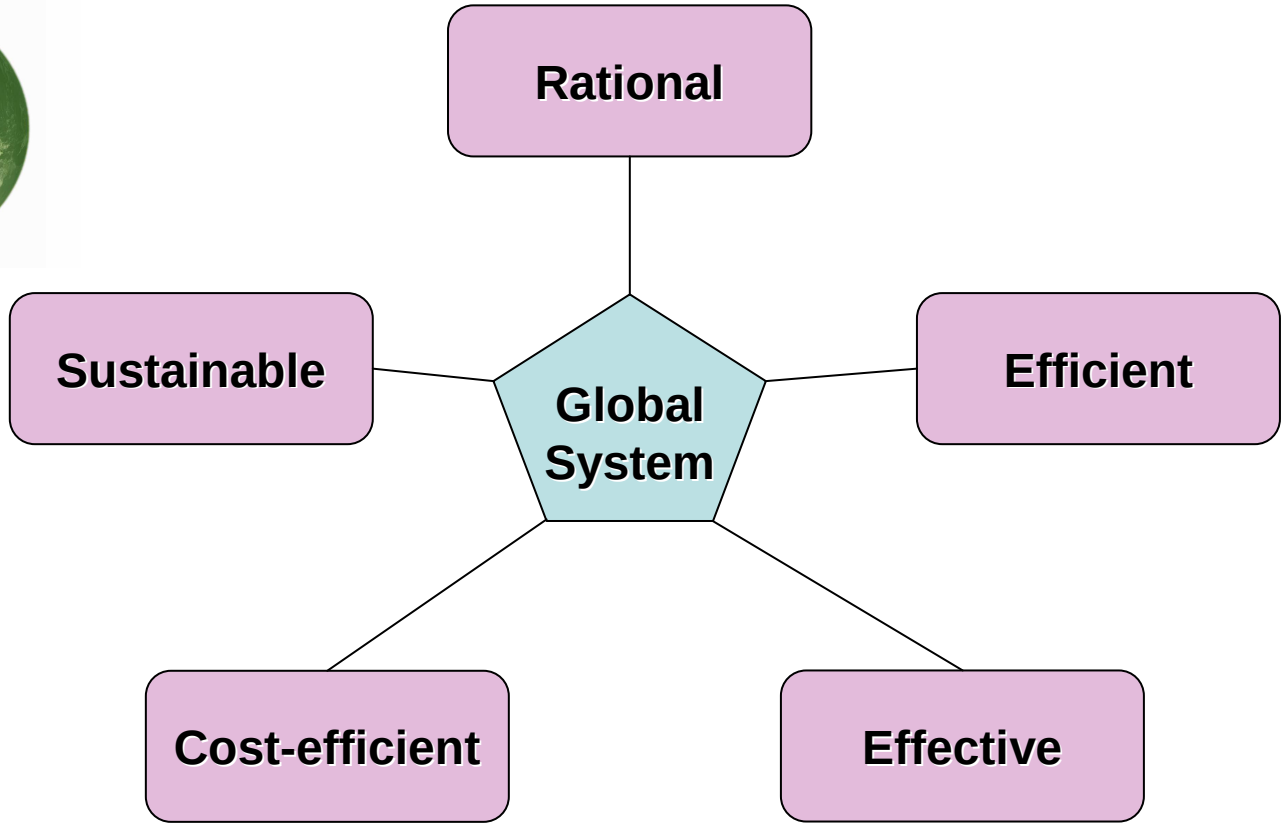
Michael Mackay

Bonn, 7 May 2009

What is the GIGA Project?

- Partnership between GCDT, ITPGRFA & Bioversity to support the global system.

GCDT Vision of a Global System

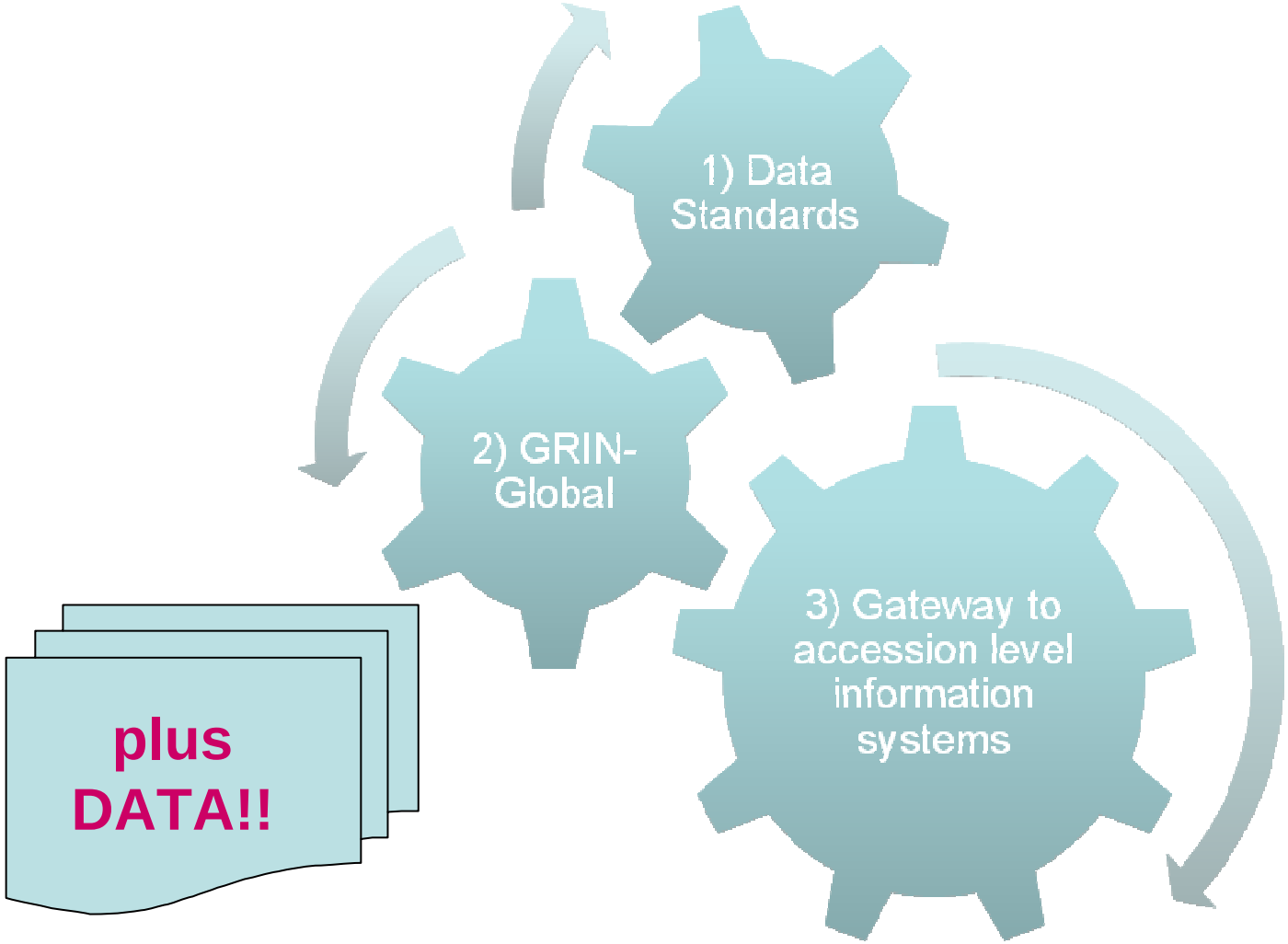


Based on a slide by Cary Fowler

What is the GIGA Project?

- Partnership between GCDT, ITPGRFA & Bioversity to support the global system.
- Three components:
  - Data Standards
  - GRIN-Global
  - Accession level information portal to > 2M accessions
- Compliant with MLS and SMTA.
- Delivery by April 2011.

GIGA - 3 components



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Data adds value to PGR

- Passport data been around for long time
- This data alone is not so useful to facilitate utilization
  - 50 year history, no exploitation methods had real impact
  - GCDT Crop Strategies etc

So what's the problem?

Improving conservation

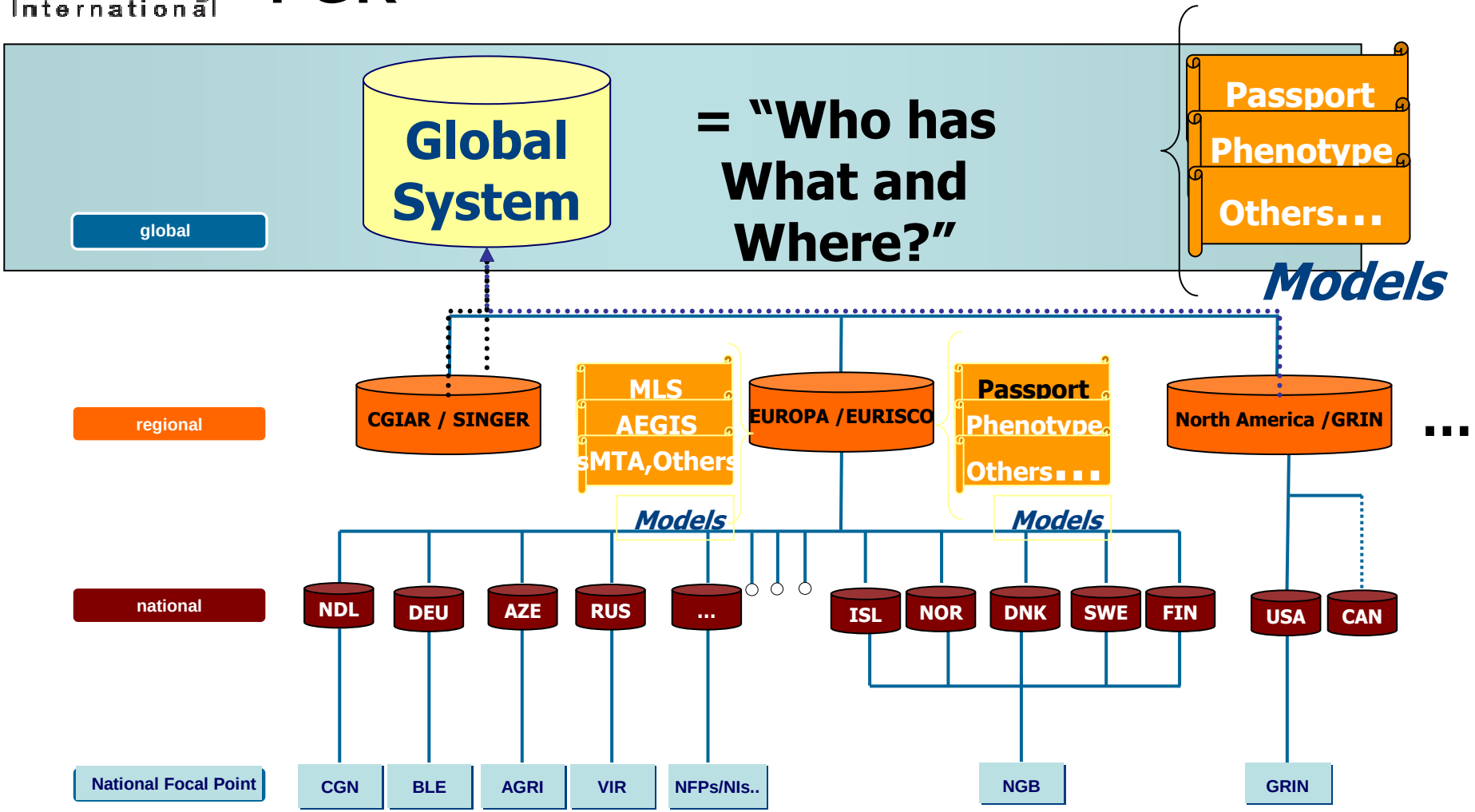
Improving data

Improving use:
Choosing the right samples for your needs

Vavilov (1957) emphasizes need to select correct 'starting material' for crop improvement.

Courtesy: R Sackville-Hamilton

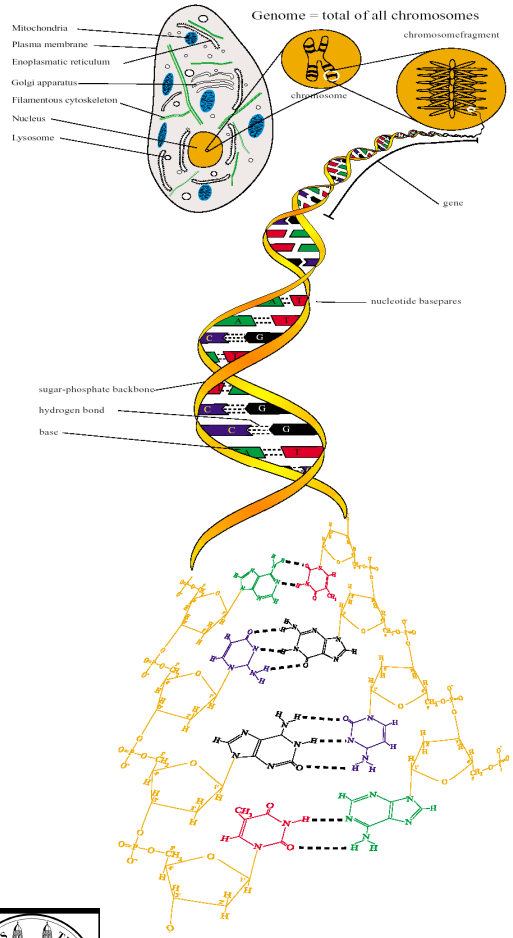
GIGA portal for accessing and utilizing PGR



Information adds value -

- Combinations of passport, characterization, evaluation and environmental data allowed selection of right accessions to double the number of known functional alleles for *Pm3* locus in just two years.

Example of Impact : Allele mining



- **16,000 bread wheat landraces**
- **1,300 chosen using FIGS[1] method (Passport + evaluation + GIS + environment data)**
- **Phenotyping showed 211 accessions either R or IR**
- **For *Pm3*: [2]**
  - **100 years classic genetics = 7 alleles**
  - **FIGS + MoBo + 2 years = 7 new alleles**
  - **At least two have new race specificity**

[1] FIGS = Focused Identification of Germplasm Strategy (various, incl. Mackay *et al*, manuscript in preparation)

[2] Kaur et al. Eur J Plant Pathol (2008) 121:387–397

C & E Data

- Who will use this type of data?
  - Policy maker
  - Bureaucrat
  - Student
  - Scientist

- Make sure we focus on who the user is, what the user wants and then provide appropriate functionality.

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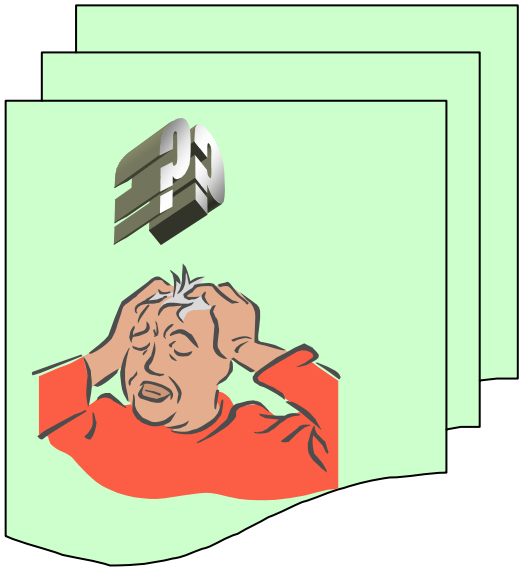
Users



P Data

answer

?

C & E
"+" Data

Location

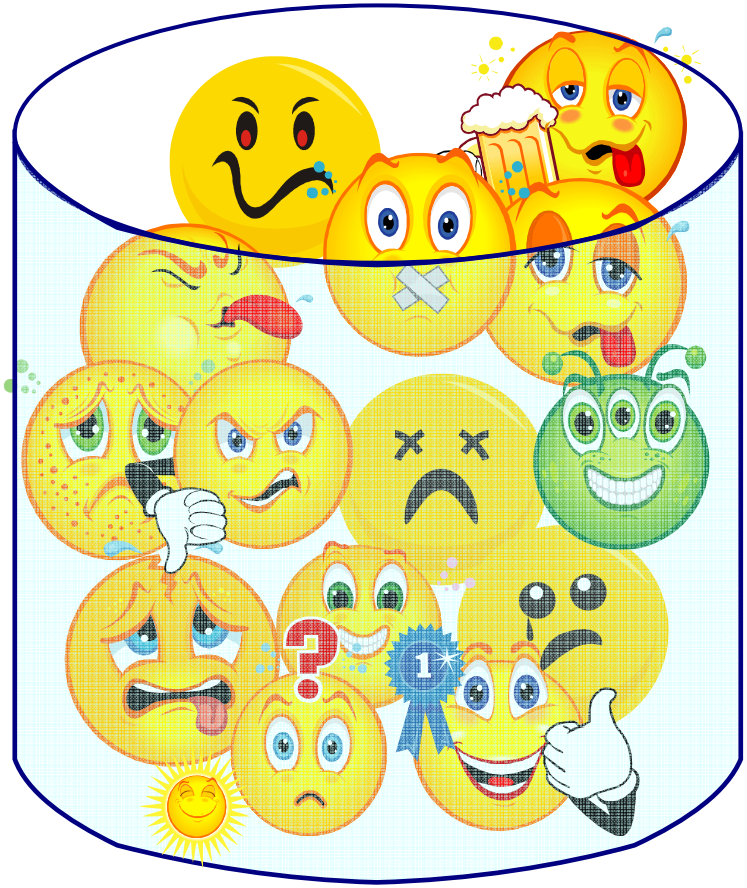
Methods

Location

Needle in a haystack?

Scientist wants a few hundred accessions to evaluate for a particular trait

How does the scientist select a small subset likely to have the trait?



6 million accessions in 1500 gene banks

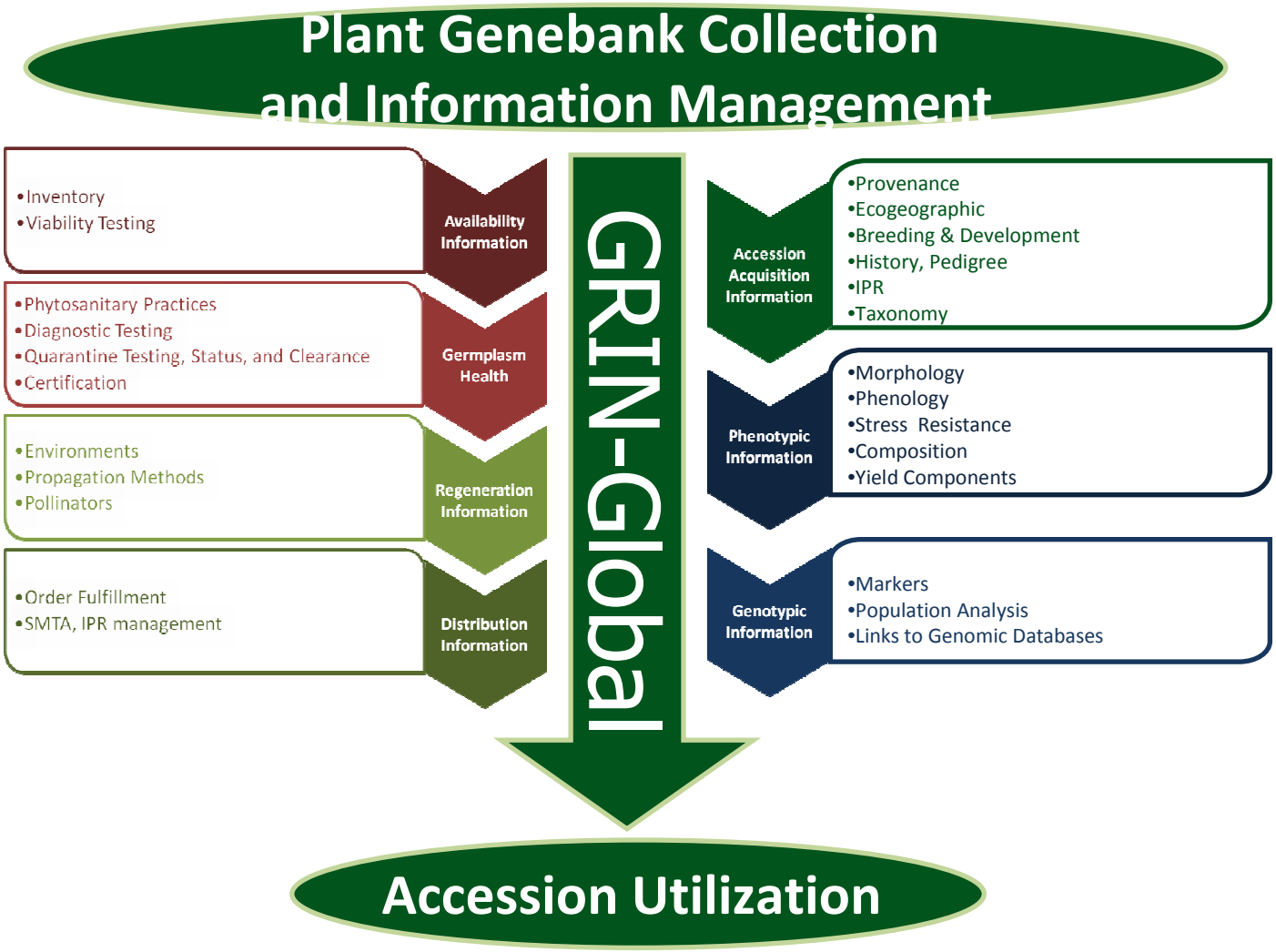
C & E Data Options

- Considered difficult to add C & E data, but GRIN & ICIS have been doing for some time.
- Difficulty not so much in storing data, but more in getting, managing & facilitating its use.
  - Need a method of accepting any data contributed
  - Need to link "families" of data. E.g. All drought related evaluation data, despite different methods, approaches etc
  - PGR users need to easily find the data they seek
  - Possible solutions....

Other data options

- Environmental data for any geo-referenced accessions
  - FIGS approach offers 60+ environmental parameters
- Visualization through mapping, download to Google Earth etc

Another option to consider…

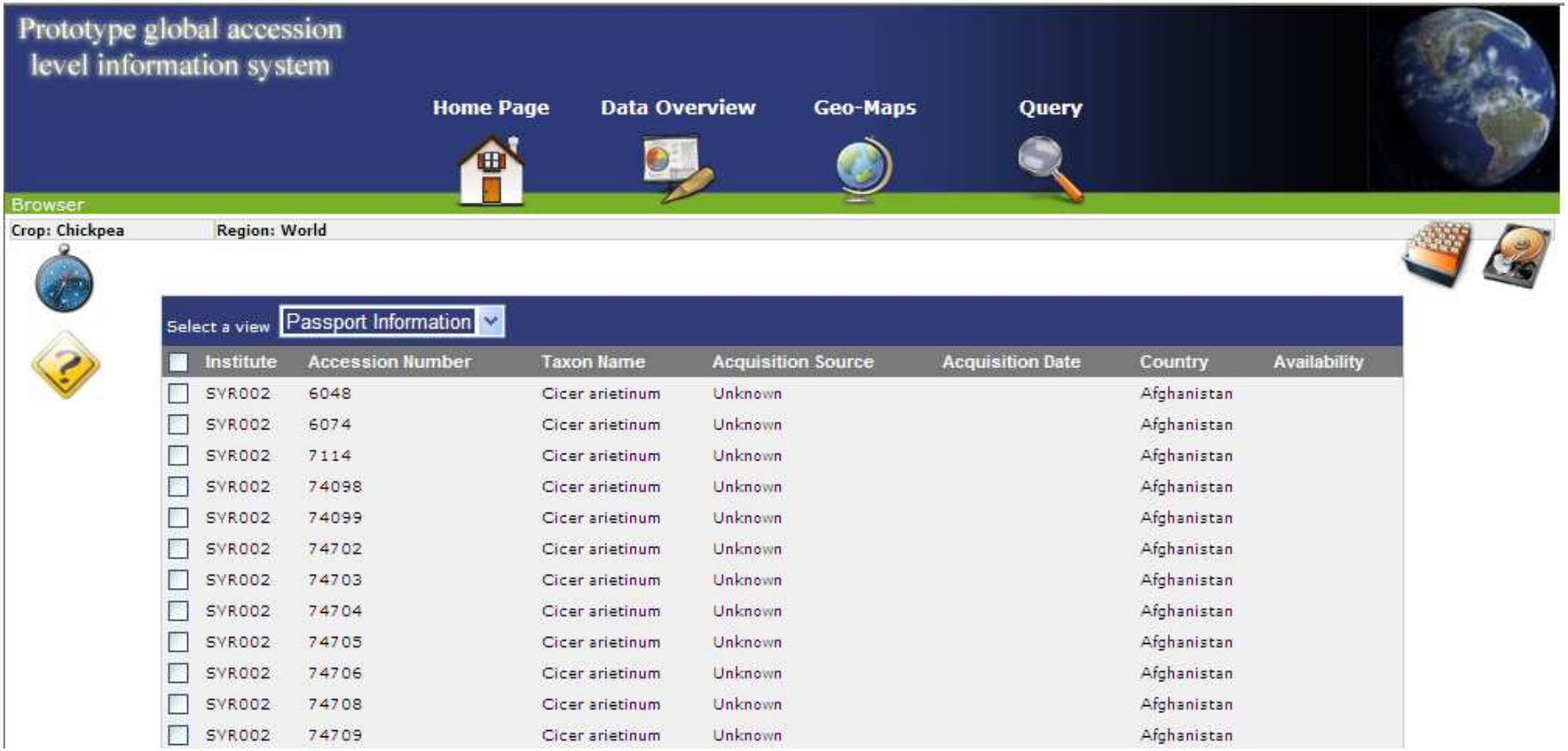


GIGA project also…

Developing these approaches including options for:

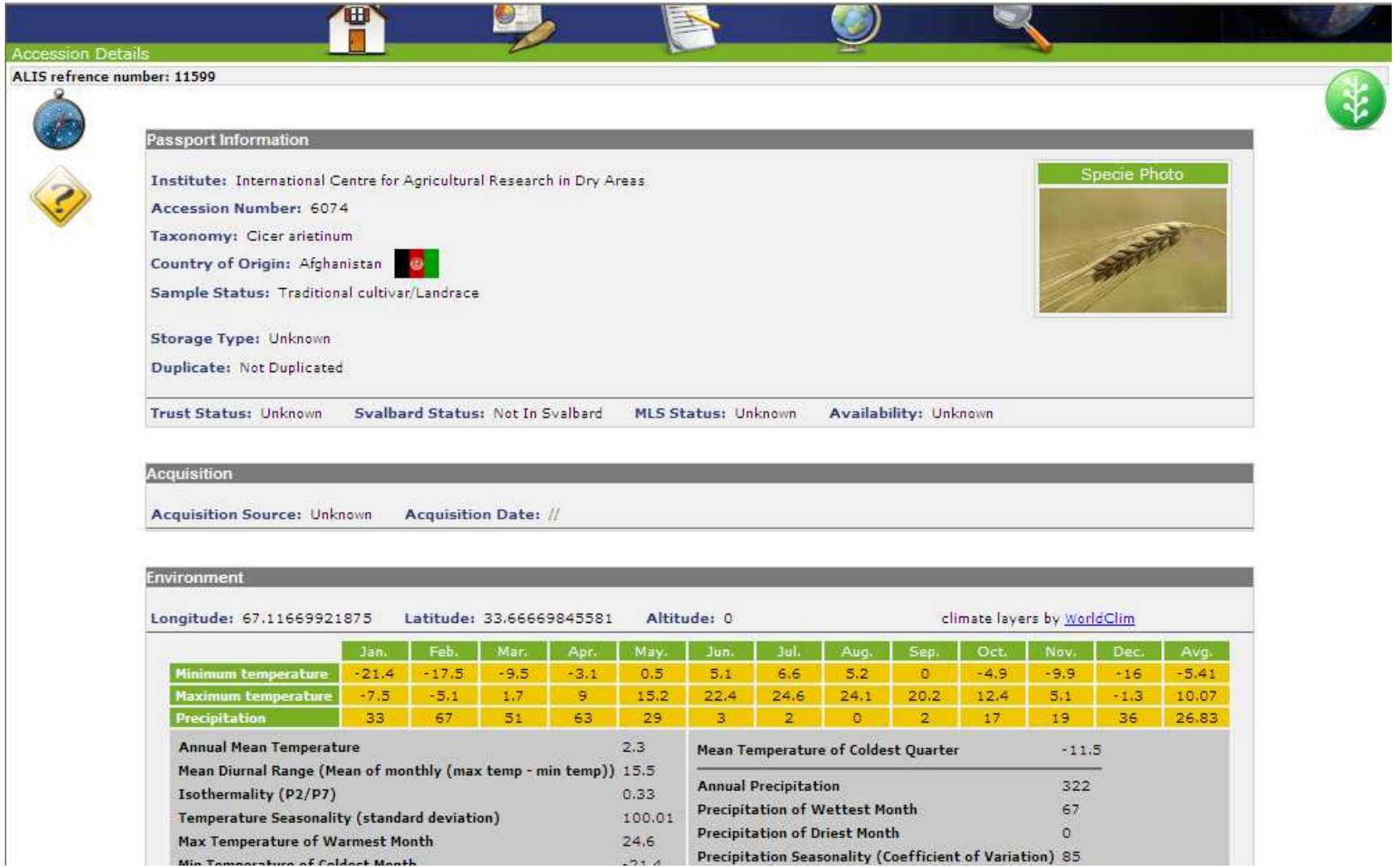
- Uploading data
- Web services tools
- Flexible genebank management software with built-in client, network and web functionality
- Opportunity for ECPGR etc to take advantage of these developments

Demonstration web site - 01



Institute	Accession Number	Taxon Name	Acquisition Source	Acquisition Date	Country	Availability
SYR002	6048	Cicer arietinum	Unknown		Afghanistan	
SYR002	6074	Cicer arietinum	Unknown		Afghanistan	
SYR002	7114	Cicer arietinum	Unknown		Afghanistan	
SYR002	74098	Cicer arietinum	Unknown		Afghanistan	
SYR002	74099	Cicer arietinum	Unknown		Afghanistan	
SYR002	74702	Cicer arietinum	Unknown		Afghanistan	
SYR002	74703	Cicer arietinum	Unknown		Afghanistan	
SYR002	74704	Cicer arietinum	Unknown		Afghanistan	
SYR002	74705	Cicer arietinum	Unknown		Afghanistan	
SYR002	74706	Cicer arietinum	Unknown		Afghanistan	
SYR002	74708	Cicer arietinum	Unknown		Afghanistan	
SYR002	74709	Cicer arietinum	Unknown		Afghanistan	

Adding environmental data…



Accession Details

ALIS refrence number: 11599

Passport Information

Institute: International Centre for Agricultural Research in Dry Areas

Accession Number: 6074

Taxonomy: Cicer arietinum

Country of Origin: Afghanistan

Sample Status: Traditional cultivar/Landrace

Storage Type: Unknown

Duplicate: Not Duplicated

Specie Photo

Trust Status: Unknown **Svalbard Status:** Not In Svalbard **MLS Status:** Unknown **Availability:** Unknown

Acquisition

Acquisition Source: Unknown **Acquisition Date:** //

Environment

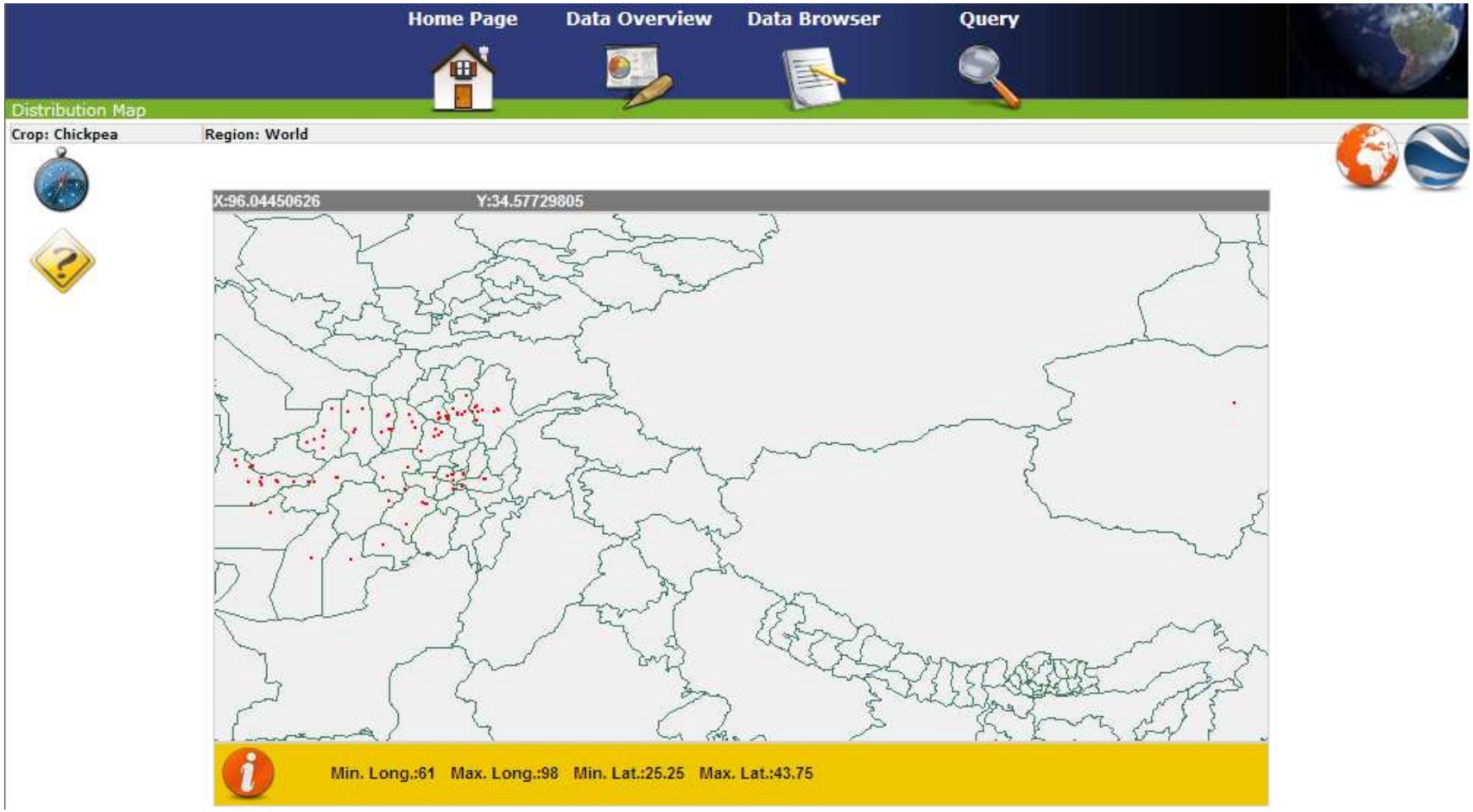
Longitude: 67.11669921875 **Latitude:** 33.66669845581 **Altitude:** 0 climate layers by WorldClim

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
Minimum temperature	-21.4	-17.5	-9.5	-3.1	0.5	5.1	6.6	5.2	0	-4.9	-9.9	-16	-5.41
Maximum temperature	-7.5	-5.1	1.7	9	15.2	22.4	24.6	24.1	20.2	12.4	5.1	-1.3	10.07
Precipitation	33	67	51	63	29	3	2	0	2	17	19	36	26.83

Annual Mean Temperature	2.3
Mean Diurnal Range (Mean of monthly (max temp - min temp))	15.5
Isothermality (P2/P7)	0.33
Temperature Seasonality (standard deviation)	100.01
Max Temperature of Warmest Month	24.6

Mean Temperature of Coldest Quarter	-11.5
Annual Precipitation	322
Precipitation of Wettest Month	67
Precipitation of Driest Month	0
Precipitation Seasonality (Coefficient of Variation)	85

And visualization functionality ….



Bioversity International

Thank you

Core GIGA team

- Adriana Alercia
- Frederick Atieno (SSA)
- Sonia Dias
- Tito Franco (AMO)
- Fawzi Nawar
- Milko Skofic
- + 1 position in India