

Interbull Technical Workshop and Industry Meeting
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Session: International Genotype Exchange (GENOEX) platform
Parentage SNP Exchange (PSE) Service



Proposal for GENOEX-PSE Business Rules

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Outline

- Setting the stage
- GENOEX services
- GENOEX-PSE Task Force
- The proposal – Draft 4

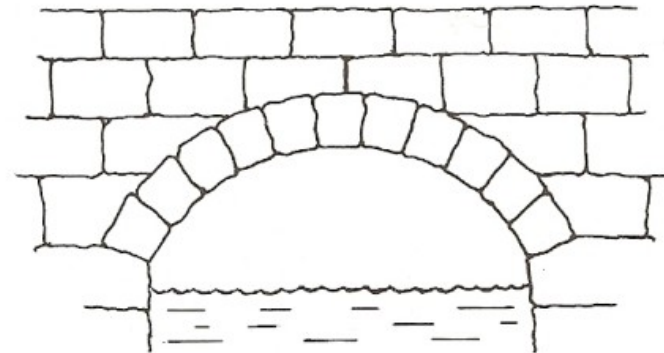
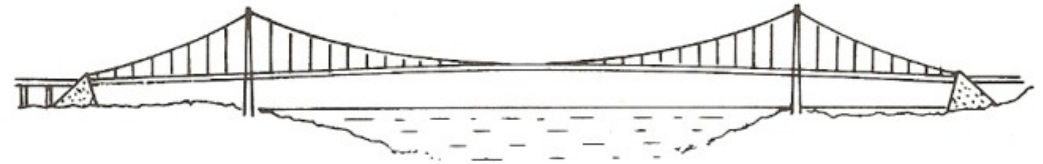


Size matters

R. H. Peters (1983) The Ecological Implications of Body Size

(St C. S. Taylor's Genetic Size-Scaling)

Figure 2.1. When the length of a bridge is greatly increased, it is necessary to change its design. A bridge supported by a stone arch (bottom) has its main supporting elements in compression. A stone arch cannot be scaled up without risk of crumbling, but the design can be changed to a suspension bridge (top), in which the main supporting elements are steel cables in tension. Stone has high compressive strength but low tensile strength; steel, in contrast, has high tensile strength. From Schmidt-Nielsen (1975*a*).



Thus, three parameters can be changed when the size of a structure is to be increased:

- 1 Dimensions (e.g., thicker walls)
- 2 Materials (e.g., from brick to steel)
- 3 Design (e.g., from compression to tension elements)



Size of Operations (Genetic Evaluation)

One example from Interbull's work package MACE:

1994: 9 C, 2 B, 3 T = 45 CxBxT combinations

2015: 34 C, 6 B, 41 T = 1843 CxBxT combinations

Add: GMACE, Validation (MACE & GMACE), InterGenomics, InterBeef, ...



Size of Operations (parentage Data)

- Increase in the number of markers (STR vs SNP)
- Increase in the number of labs
- Increase in the number of across country checks
- Increase in the international trade
- Etc., Etc.

- **CONCLUSION:**
- **Some change in the working methods is necessary**



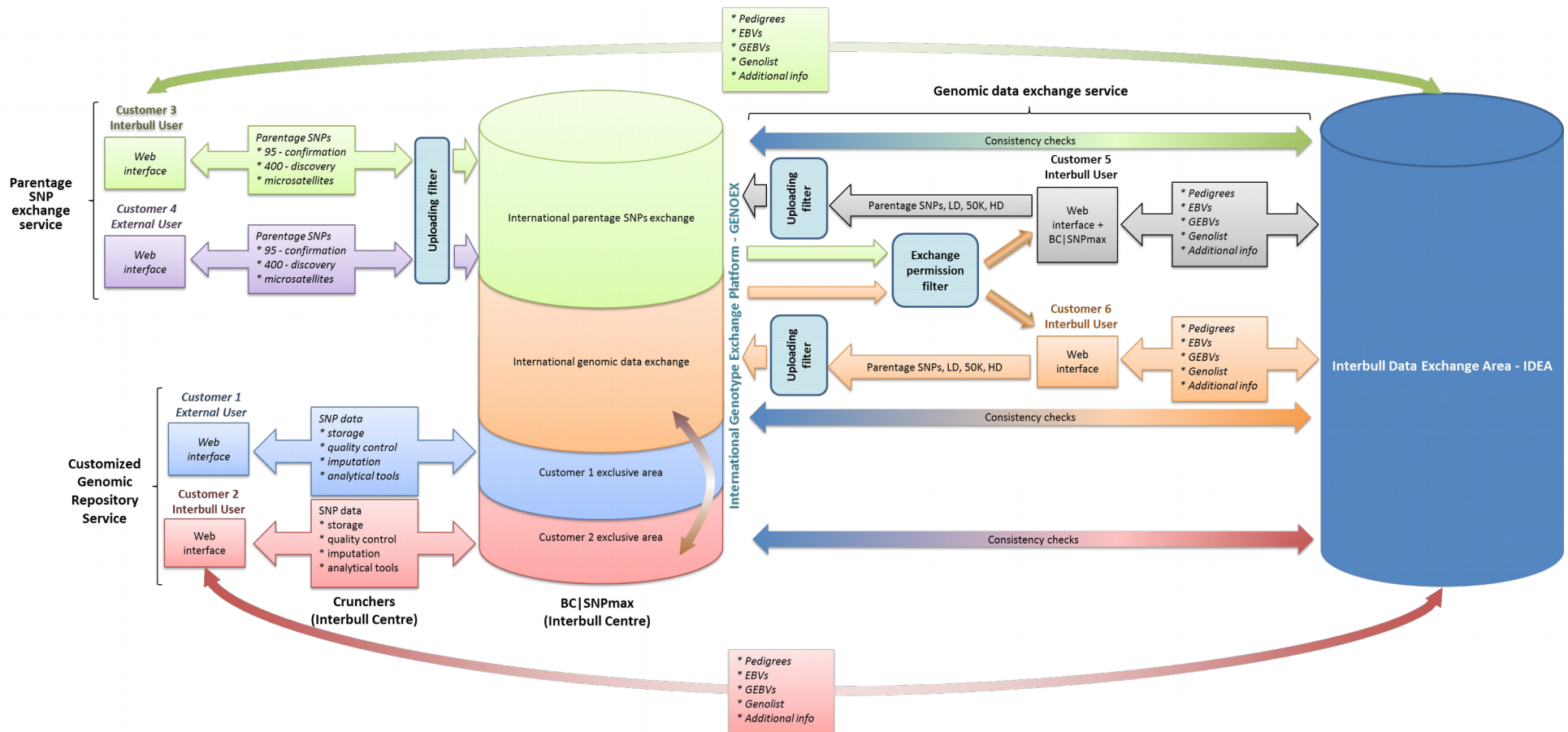
"A" Suggestion

International Genotype Exchange (GENOEX)
platform

- **Parentage SNP Exchange (PSE) service**
- Genomic Data Exchange (GDE) service
- Customized Genomic Repository (CGR) service

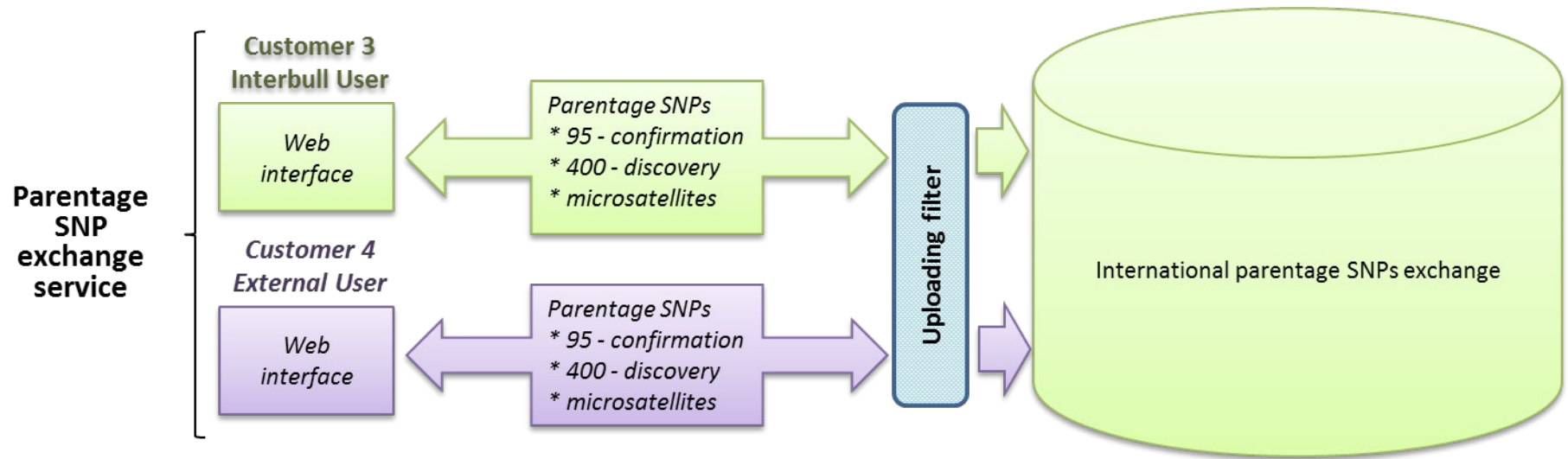


International Genotype Exchange (GENOEX) platform





Parentage SNP Exchange (PSE) service





GENOEX – PSE Task Force

1. Sophie Mattalia, **Interbull Steering Committee;**
2. Suzanne Harding, **ICAR Parentage Recording Working Group;**
3. Wim van Haeringen, **ICAR Genetic Analysis Working Group;**
4. Matthew Shaffer, **ICAR Breed Associations Working Group;**
5. Andrew Cromie, **ICAR Interbeef Working Group,**
6. Secretary: Brian Van Doormaal, Interbull Steering Committee;
7. Convener: Hossein Jorjani, Deputy Director of the Interbull Centre;



GENOEX – PSE Business Rules

DRAFT 4

Updated 2015-02-18



Background

GENOEX-PSE

- Is just a facilitating tool, and as such, not a replacement for national authorities.
- Is commissioned to enable different levels of services if there is enough **ICAR** sanctioned demand from **ICAR** membership to expand its services



SERVICE LEVELS

- **Gradual step-wise implementation** of different service levels:
- Exchange of molecular genetic data (e.g. **SNP**) required for parentage;
 - Exchange of **SNP** data for parentage verification;
 - Exchange of **SNP** data for parentage discovery;
 - Exchange of **STR** data for parentage verification/discovery;



SERVICE ELIGIBILITY

An “**inclusive**” philosophy:

- Organizations officially in charge of parentage certification in each of the **ICAR** member countries, or otherwise traditionally providing parentage certificate
- Organizations that in their capacity as the official body in charge of genetic/genomic evaluation services
- **ICAR/ISAG** accredited laboratories that are under contract with the organizations identified in 1 or 2 above



GENOEX-PSE EXPERT GROUP

- **Technical experts nominated** by:
- **Service ICAR** (chairperson);
- **ICAR** Parentage Recording Working Group;
- **ICAR** Genetic Analysis Working Group;
- **ICAR** Breed Associations Working Group;
- **Interbull**;
- **Interbeef**;
- **Interbull Centre.**



User Rights

■ User rights:

- Access to **GENOEX-PSE** for uploading and downloading of its own data;
- Access to **GENOEX-PSE** for downloading the SNP data for the animals of international trade interest;
- Access to **GENOEX-PSE** for uploading and downloading of data from other organizations after bi- and multi-lateral agreements are reached in accordance with the business rules defined herein.



User Obligations

■ User obligations:

- Commit to uploading its data, when any exists, on a regular basis in order to be eligible to download data provided by other organizations.
- Follow ICAR rules and regulations decided by the relevant ICAR bodies;
- Follow ICAR/ISAG accreditation rules and regulations;
- Follow the ICAR quality assurance standards for the SNP/STR data as established by the relevant ICAR bodies.



DATA USAGE

- 1- Parentage verification based on pedigree information;
- 2- Communication of parentage conflicts to the national authorities;
- 3- Parentage discovery given availability of sufficient data;
- 4- Discovery of Maternal Grandsire;

- 5- Exclusion of pedigree data submitted to the Interbull Centre (via the Interbull Data Exchange Area) for its international genetic and genomic evaluation services.



Data Types (1)

- 1- **SNPs** defined by a scientific organization (such as **ISAG**);
 - Extra **SNPs** (common among **SNP** panels of >6K?);
- 2- Animals of interest for international trade;
- 3- **SNP** coding decided by the relevant **ICAR** bodies;
- 4- Animal identification shall follow the **ICAR** rules;



Data Types (2)

5- Means of data exchange shall be as versatile as possible;

6- Data on quality measures ← “GENOEX PSE Expert Group”;

7- Additional information on the genotyping laboratory;



Data Quality Standards

(Extra emphasis)

Data quality standards ← “**GENOEX PSE Expert Group**”



Conflict Resolution

- Conflicts arising from different **SNP/STR** being reported for the same animal;
- Conflicts arising from the difference between the **SNP/STR** data and the pedigree certificate.



Service Fees

Non-for-profit fee structure

A) **SNP/STR** Exchange services: fixed annual service fee;

B) Analysis of **SNP/STR** data: variable annual service fee.



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