



D4.1 - Survey on user requirements and application scenarios for mouse resources and data (June 2016)

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Summary

- The survey on user requirements and application scenarios for mouse resources and data was aimed at:
 - providing data on how mouse resources in general, and the resources and data of INFRAFRONTIER and the IMPC in particular are being used,
 - which user requirements are not being met,
 - how the mouse resources and data could be improved to meet the specific user requirements.
- Two approaches were followed: analysis of the EMMA database in terms of requested mouse lines by bio-pharma industry users as well as analysis of the INFRAFRONTIER & IMPC users feedback survey
- Over a period of 10 years (August 2005 – February 2016) a total of 4406 lines have been requested at the European Mouse Mutant Archive.
- 98% of the total requests are provenient of academic institutions whereas 2% of the total requests are provenient from bio-pharma industry
- The European Mouse Mutant Archive (EMMA) has a global coverage; 51% of mouse lines requested come from European Institutions, 33% of the mouse lines requested come from North American institutions whereas 14% of the mouse lines request come from Asia and Australasia institutions.
- In order to increase the awareness of resources and services provided by INFRAFRONTIER among bio-pharma industry users a set of recommendations are documented in this report
- INFRAFRONTIER IMPC user feedback survey, consisting of 50 questions about the user experience on IMPC and INFRAFRONTIER webportals was sent in April 2016 to 1000 INFRAFRONTIER IMPC users. The survey response rate was 12,5%
- Overall INFRAFRONTIER web portal scored well in terms of meeting the user needs, trustiness and easiness to find information. Nevertheless a series of recommendations to improve the user friendliness of INFRAFRONTIER webportal are brought forward in this report

Introduction, objectives & approach

- The IPAD-MD project (Research Infrastructure for Phenotyping, Archiving and Distribution of Mouse Diseases Models) addresses the global cooperation and coordination between INFRAFRONTIER and complementary research infrastructures world-wide, contributing to the global effort of IMPC. As such IPAD-MD focusses on key stakeholder involvement, specifically by surveying their needs and thus by **engaging key stakeholders to improve INFRAFRONTIER and IMPC resources and services**
- IPAD-MD WP4 - Engagement with Users & Industry aims at :
 - Engaging with the academic and bio-pharma industry user communities
 - Survey specific user requirements and application scenarios for mouse resources and associated data as input to the IPAD-MD Workshops
- In addition it is of importance to determine which key stakeholder groups should be addressed at the IPAD-MD Stakeholder Engagement Workshops, specifically within academic and bio-pharma industry users.
- As a specific task of the WP4- Engagement with Users and Industry, it was proposed to **produce and conduct a survey** that to be distributed among the key stakeholders from user communities and industry.
- The **aim** of this survey is to provide data on how mouse resources in general and the resources and data of INFRAFRONTIER and the IMPC in particular are being used, which user requirements are not being met, and how the mouse resources and data could be improved to meet the specific user requirements.
- For the current report two different **approaches** were followed:
 - Analysis of the EMMA database regarding, number of mouse lines requested from academic and industry users and its geographic distribution
 - Analysis of the survey results on the IMPC and the INFRAFRONTIER website feedback.

Results

INFRAFRONTIER

- Over a period of 10 years (August 2005-February 2016) a total of 4406 mouse lines have been requested at the European Mouse Mutant Archive (EMMA). Mouse lines requested by the academic sector represent 98%, whereas bio-pharma industry sector represents 2% of the total number of mouse lines requested (Figure 1).

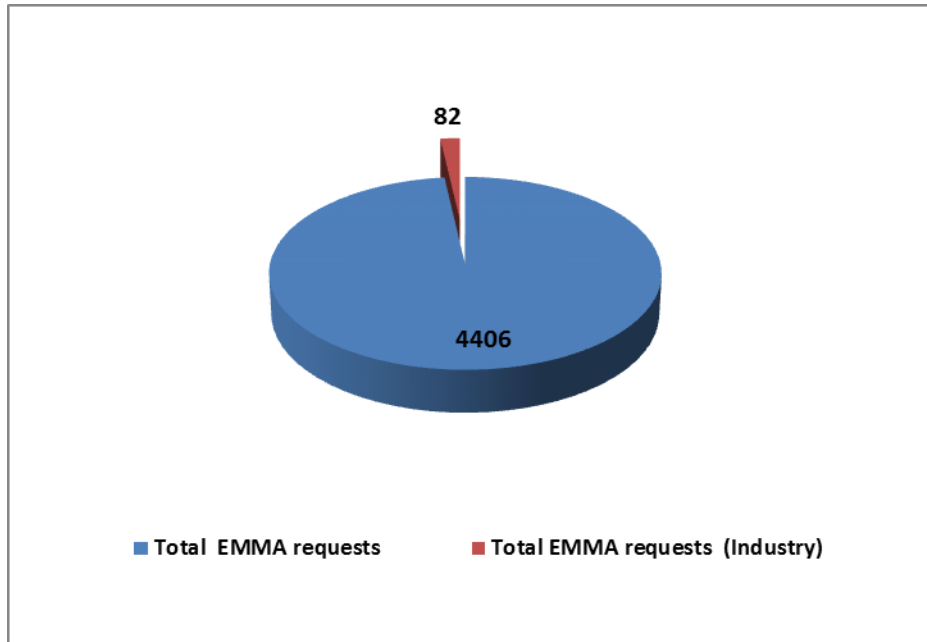


Figure 1. Number of mouse lines requested at EMMA (2005-2016)

4.1.1 INFRAFRONTIER Academic Users

- 51%** of the mouse lines have been requested by **European academic institutions**, **33%** of the mouse lines have been requested **North American academic institutions**, **14 %** of mouse lines have been requested by **Asia and Australasia academic institutions**, whereas **South American and African academic institutions** requested **0,2%** and **0,1%** of the mouse lines at the EMMA, respectively (Figure 2).

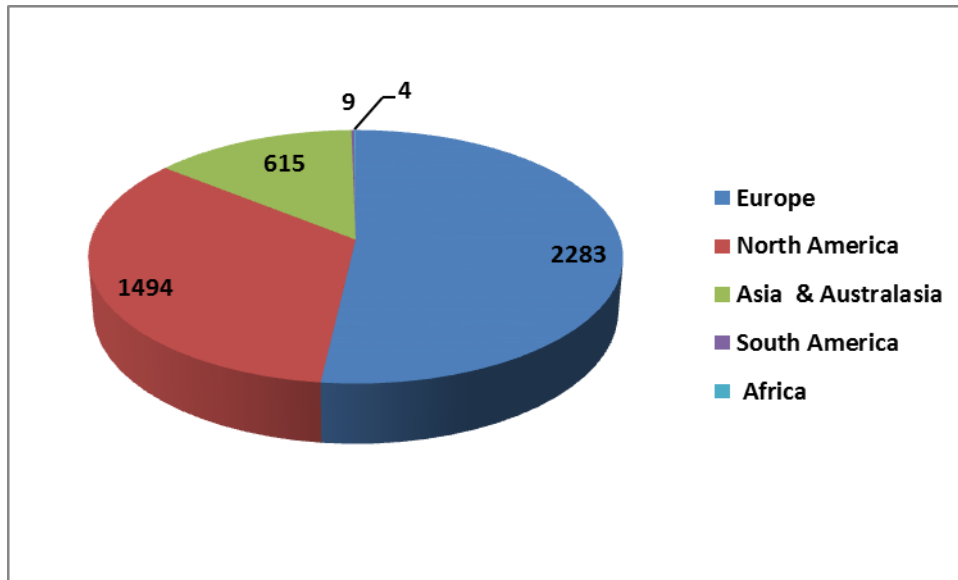


Figure 2. Geographic distribution of mouse lines requested (%) at EMMA from academic users (2005-2016)

INFRAFRONTIER bio-pharma industry users

- Geographic distribution of the industry users requests show that **49%** of the requests come from **Australia and Asian**, **30%** from **Europe** and **16%** from **United States of America** (Figure 3).

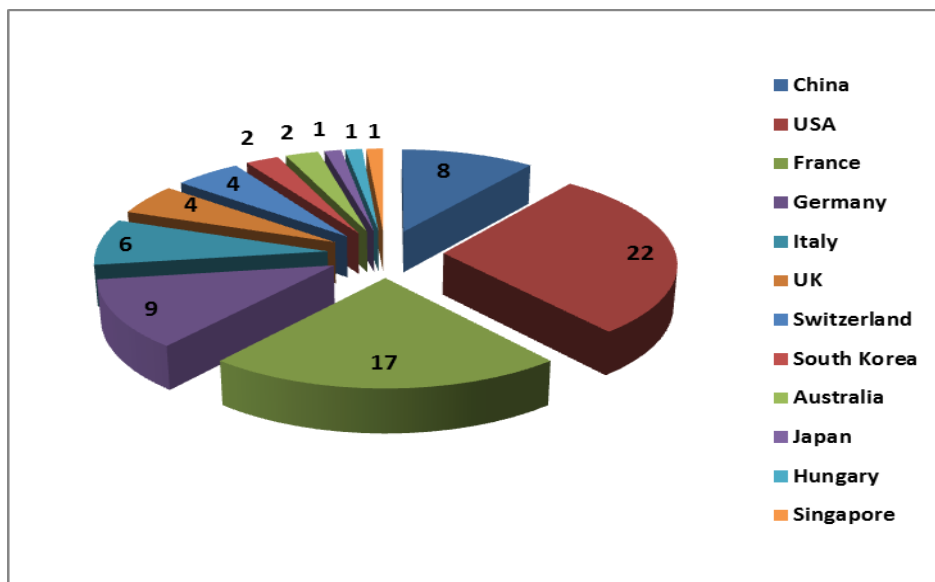


Figure 3. Total number of mouse lines requested at EMMA from industry users distributed per country (2005-2016).

- Among the bio-pharma industry users, Charles River-USA requested a total of 17 mouse lines; Charles River-France requested 10 the mouse lines and MFD Diagnostics GmbH requested 7 mouse lines. **(Figure 4)**

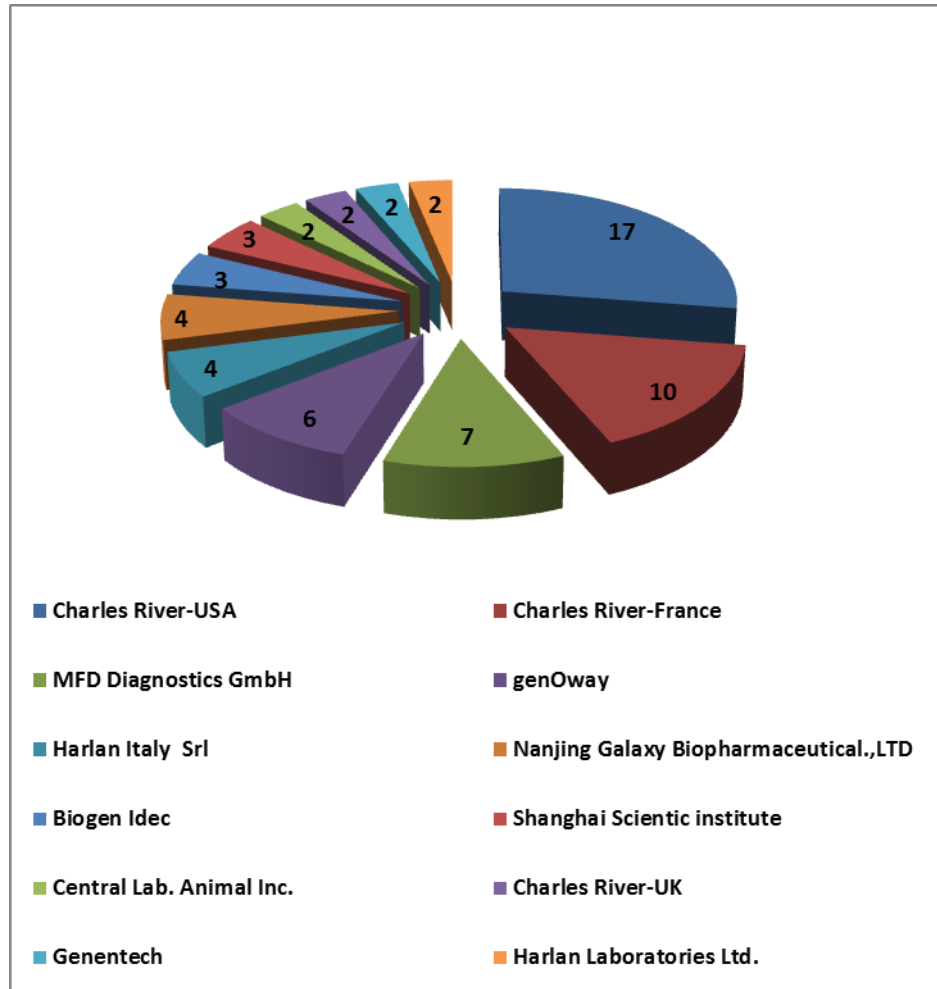


Figure 4. Total number of mouse lines requested at EMMA from bio-pharma industry users distributed per company (2005-2016).

INFRAFRONTIER and IMPC user survey

- The user feedback survey was sent to INFRAFRONTIER and IMPC users in order to better access their needs, their experience and their satisfaction level, when navigate at both webportals and ultimately, when requesting mouse lines.
- The survey was sent in April 2016 to around 1000 participants, the response rate was 12,5%
- The major proportion of the INFRAFRONTIER and IMPC users indicated as main occupation biology researcher (80%) (**Figure 5**), specialized in genetics/genomes (44%), cell biology (28%) and neurobiology (22%) (*data not shown*).
- In terms of further (bio) informatics specialization, 57 % of the users indicated being specialized in biological databases, 36% in computational biology and 15% in ontology and terminology (*data not shown*).

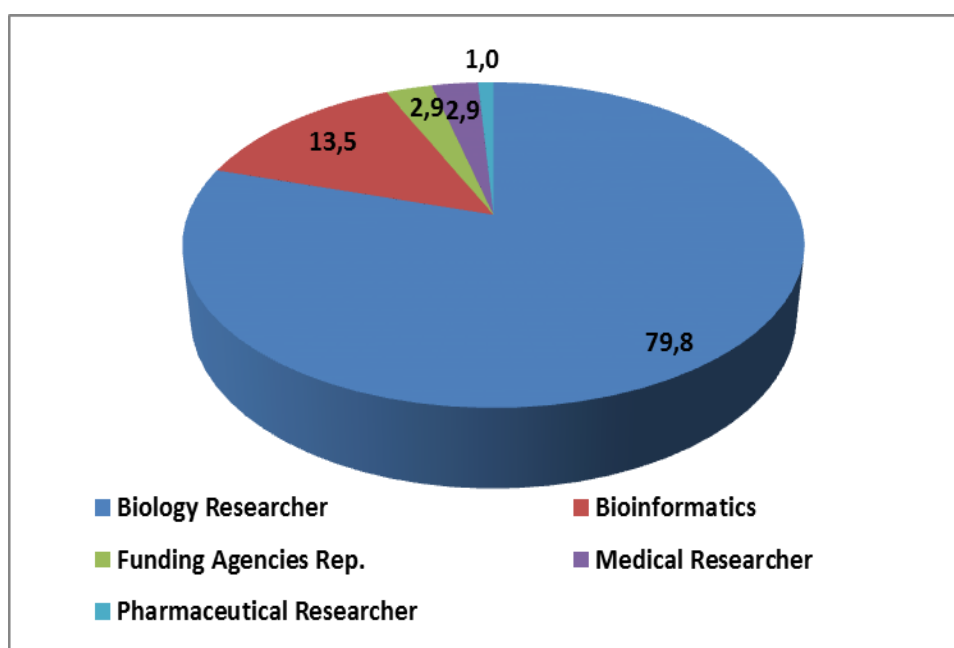


Figure 5. Main job occupation indicated by the INFRAFRONTIER and the IMPC users (%).

- When enquired about the main resources used to find mouse models the users selected in the first place Mouse Genomes Informatics / The Jackson Laboratory portals (70%). The IMPC webportal was indicated as second main resource (63%) whereas INFRAFRONTIER webportal was indicated as fourth with 31% responses (**Figure 6**).

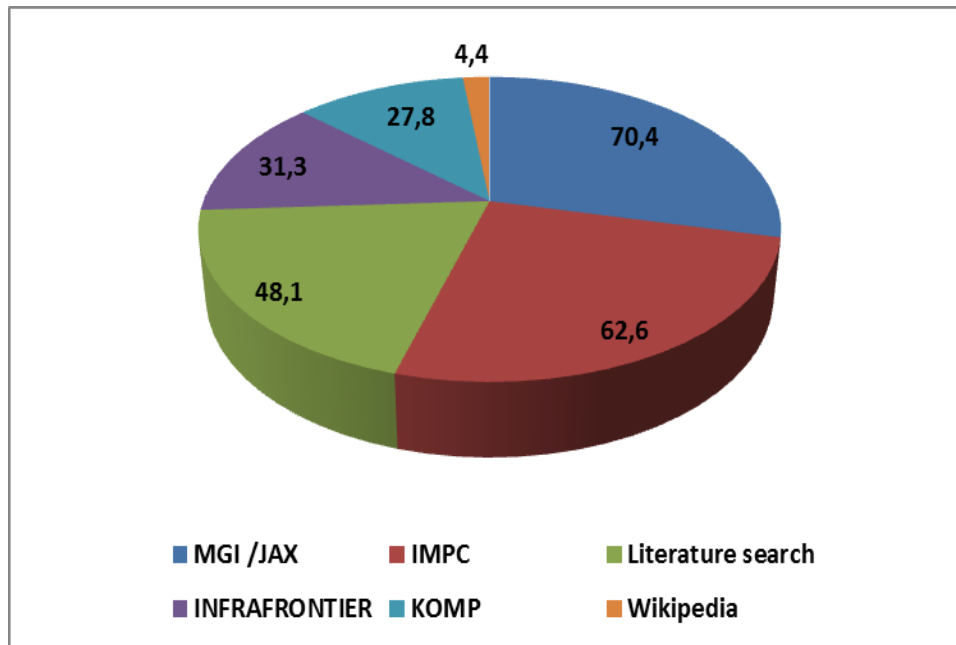


Figure 6. The resources most commonly used to find mouse models (%).

- Regarding the frequency in which both INFRAFRONTIER and the IMPC webportals were accessed 'ocassionally' was the most common answer (INFRAFRONTIER: 43%, IMPC: 36%, **Table 1**).

Table 1. How often do you use the INFRAFRONTIER and the IMPC websites?

	INFRAFRONTIER	IMPC
Daily	3	12
Weekly	5	21
Monthly	1	13
Ocassionally	43	36
Once	15	5
Never	33	12

- Concerning the type of information that is most searched for in the INFRAFRONTIER portal *knockout strain availability*, *pricing information* and *humanised mutant mouse model* were ranked as of the **highest** importance whereas information about *Material Transfer Agreements* was ranked as the **least** important.
- Regarding the IMPC webportal both *knockout strain availability* and *phenotypes that are associated with a gene of interest* were selected as having the **highest** importance

whereas *general information about the project* was selected as having the **least** importance (**Table 2**).

Table 2. What kind of information do you look for in the INFRAFRONTIER and IMPC websites?

	INFRAFRONTIER	IMPC
Knockout strain availability	Highest importance (64)	Highest importance (51)
Phenotypes that are associated with a gene of interest	Medium importance (25)	Highest importance (38)
Human diseases associated to a gene of interest	Medium importance (28)	Medium importance (25)
Genes that are associated to a gene of interest	Medium importance (35)	Highest importance (20)
Material Transfer Agreements	Lowest importance (39)	X
Pricing information about mouse strains	Highest importance (35)	X
Humanized mutant mouse models	Highest importance (19)	X
Tissues that a gene is expressed in	X	Medium importance (24)
Data set download	X	Lowest importance (22)
General information about the project	X	Lowest importance (33)

(x) Questions not applicable in either the INFRAFRONTIER or in the IMPC parts of the survey; numbers in brackets as expressed in %

- Concerning the easiness to find the information that users are searching at both webportals the majority of the users selected *moderately* (INFRAFRONTIER: 56%, IMPC: 50%, **Table 3**) as well as how well do both webportals meet the user needs with 50% *moderately well* for INFRAFRONTIER and 48% for the IMPC (**Table 3**).
- The same trend is observed when the respondents are asked how well do both webportals meet their needs (moderately well: 56% INFRAFRONTIER, 50 %IMPC; **Table 4**)

Table 3. How easy was it to find what you were looking for on the INFRAFRONTIER and IMPC websites?

	INFRAFRONTIER	IMPC
Extremley easy	0	2
Very easy	40	30
Moderately easy	56	50
Not so easy	4	15
Not easy at all	0	2

Table 4 Overall, how well does the INFRAFRONTIER and IMPC websites meet your needs?

	INFRAFRONTIER	IMPC
Extremley well	2	2
Very well	44	42
Moderately well	50	48
Not so well	4	6
Not well at all	0	3

- In relation to the easiness to find the relevant phenotype information, both the INFRAFRONTIER and the IMPC webportals scored from *moderately easy* to *very easy* 45% and 44% (**Table 5**)

Table 5 How easy was it to find a phenotype information related to a gene of interest

	INFRAFRONTIER	IMPC
Extremley easy	7	16
Very easy	39	44
Moderately easy	45	27
Not so easy	5	11
Not easy at all	5	3

- When questioned about the easiness to find MTA and pricing information at the INFRAFRONTIER portal, the majority of the respondents selected '*moderately easy*' (49%) to '*very easy*' (34%).
- Nevertheless, in the open field text box, several remarks documented the need to improve the section 'Legal issues' were currently the MTAs area now stored (eg. by using less specific language, by accessing it with less clicks)

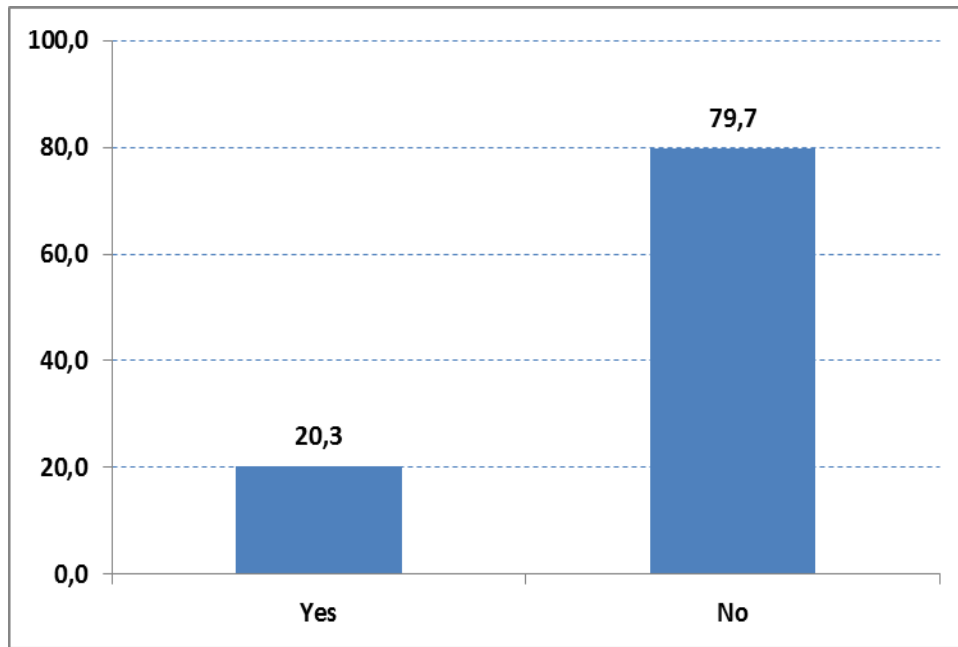


Figure 7. Did you ever order a mutant mouse strain via the IMPC webportal?

- When questioned on whether the respondents have ever ordered a mutant via the IMPC webportal only 20,3% have answered *yes* (**Figure 7**)

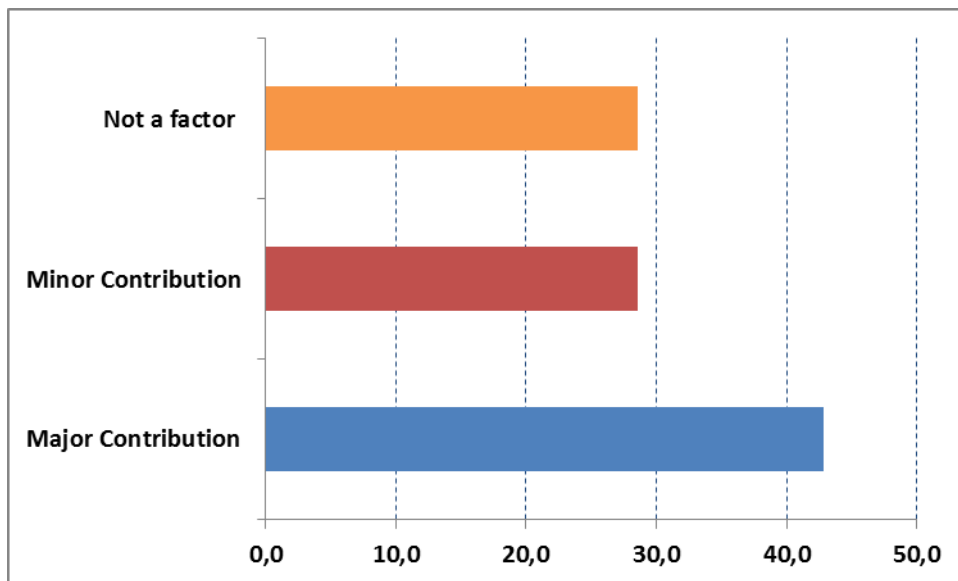


Figure 8. Did IMPC phenotype data contribute to your decision to obtain these mutant mouse strains?

- When questioned on whether the IMPC phenotype data contribute to the decision of ordering a mouse mutant line, 42% mentioned it as a major contribution (**Figure 8**)

- In relation to the trustworthiness of the information displayed, both webportals scored very similarly with around 60% of the repondents selected with *a lot* (**Table 5**).

Table 5. How much do you trust the information on the webportals?

	INFRAFRONTIER	IMPC
A great deal	13	15
A lot	59	58
A moderate amount	28	21
A little	0	3
Not at all	0	3

- Regarding the additional resources that should be incorporated into the websites, the majority of the users suggested the integration of *mouse phenotypes from literature* (INFRAFRONTIER: 86%, IMPC: 81%) followed by *gene expression (transcriptome) information* (INFRAFRONTIER: 43%, IMPC: 44%, **Table 6**)

Table 6. What resources would you like to see incorporated into the INFRAFRONTIER and IMPC webportals?

	INFRAFRONTIER	IMPC
Gene ontology	29	33
Mouse phenotypes from literature	76	81
Protein families	20	28
Signalling pathways	35	42
Gene expression (transcriptome)	43	44
Drug target information	29	34
Cellular phenotypes	22	18

Conclusions and recommendations

- Mouse lines deposited at EMMA are mainly requested by academic Institutions (98% over a period of 10 years)
- Mouse lines requested by bio pharma industry partners represent a minimal fraction of the total requests (2% over a period of 10 years)
- In order to increase the amount of lines requested by industry (bio-pharma) partners and thus to increase the visibility of INFRAFRONTIER resources and services, specific measures targeted at industry partners could be defined:
 - Currently the organization of the INFRAFRONTIER Industry & Innovation Workshop (June 2016) will constitute a further step towards increasing awareness of the INFRAFRONTIER resources and services among the industry community, which will build on the achievements and results from the INFRAFRONTIER/IMPC/UAB Industry liaison meeting 2014. Strengthening the collaboration with biopharma could be tackled in other INFRAFRONTIER related events e.g. INFRAFRONTIER training courses, INFRAFRONTIER Stakeholders workshops
 - Efforts should be put into the further development of joint technology partnerships, between INFRAFRONTIER and IMPC partners and bio-pharma industry (eg. existent partnerships with TSE system and Ayoxxa Biosystems, as partners of INFRAFRONTIER-I3, to name few)
- The most searched information at the INFRAFRONTIER portal concerns *knockout strain availability, pricing information and humanised mutant mouse model*. In view of such, periodic revisions and updates are already implemented but regular improvements could be brought forward by the INFRAFRONTIER Coordination Office (better linkage between different mouse data portals, implementation of a new section on humanized mouse models sources and availabilities)
- Overall, INFRAFRONTIER web portal scored well in terms of meeting the needs of their users, trustworthiness and easiness to find information.
- Taking together the results of the user survey and the results of the UX facilitators workshop (WP7, Hinxton October 2015) recommendations for improvement and thus to make the INFRAFRONTIER webportal more intuitive and more user-friendly, can be put forward as below:
 - A revision (re-structuration, shortening and update) of the menus and text displayed at the INFRAFRONTIER webportal should be scheduled.
 - Inclusion of the INFRAFRONTIER mission statement at the home page should be scheduled in order to inform the users about the INFRAFRONTIER essence

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