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## **AQUAEXCEL: Building a European network of aquaculture research infrastructures**

Marc Vandeputte, Marieke Reuver

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**AQUAEXCEL: Building a European network  
of aquaculture research infrastructures**

**Aquaculture Europe 2014 - San Sebastián**

**16 October 2014**

**Marc Vandeputte  
INRA, France  
AQUAEXCEL coordinator**



# AQUAEXCEL – At a glance

- Aquaculture Infrastructures for Excellence in European Fish Research
- FP7, Capacities; RI (11.8M€ budget)
- 17 partners, 10 countries, 23 infrastructures
- March 2011 – February 2015 (4 years)

**Main goal:** to integrate the key aquaculture research infrastructures in Europe, covering all EU fish culture systems

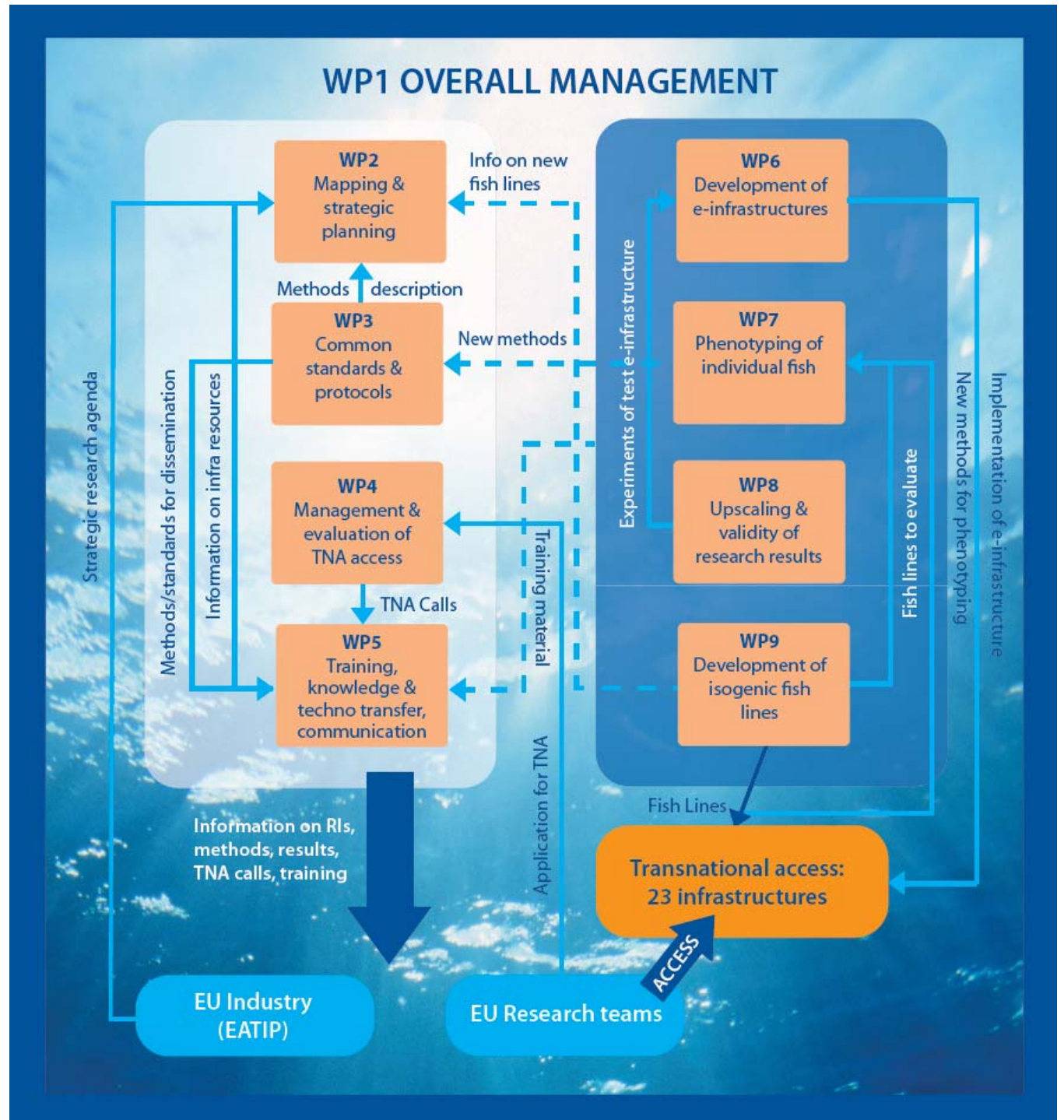
# What are 'RI projects'?

- **Research infrastructures:** Facilities, resources and related services that are used by the scientific community to conduct top-level research: **the « hardware » for conducting good research**
- **Objectives of EU Infrastructure projects:**
  - Optimise the use and development of the best research infrastructures existing in Europe
  - Ensure the access of research teams from across the EU to these infrastructures
  - Improve the services provided to researchers

# Types of activities to achieve these goals

- **Networking Activities (NA):** Co-ordinate partners infrastructures (resource and know-how sharing, communication) and give visibility
- **Transnational Access (TNA):** Give 'free of charge' access to the world-class infrastructures and resources of the consortium
- **Joint Research Activities (JRA):** Joint R&D to improve the services provided by the infrastructures

# Objectives & Structure



# AQUAEXCEL products

The web site: see all our results at [www.aquaexcel.eu](http://www.aquaexcel.eu)



The screenshot shows the AQUAEXCEL website homepage. At the top left is the AQUAEXCEL logo, featuring a map of Europe and the text 'AQUA EXCEL'. Below the logo is a navigation menu with links: Home, The Project, Results, Consortium, Call for Access, Interactive map, Training Courses, Events, Links, Glossary, Media Centre, and Search.

The main content area is divided into several sections:

- Upcoming Events:** A list of events with dates and titles, including 'Aquaculture Europe (AE) 2014' (14-17.10.2014), 'AQUAEXCEL Industry Workshop, "Research Infrastructures: adding value to European aquaculture industry"' (17.10.2014 10:30 - 12:50), and 'The International Symposium on Genetics in Aquaculture - ISGA XII (2015)' (21.06.2015 - 27.06.2015).
- Calendar:** A calendar for October 2014, showing dates from 29 to 9.
- Home:** A large image of an aquaculture facility with rows of cages in a body of water.
- Welcome to the AQUAEXCEL Project Web Site:** A section with key information:
  - Title:** Aquaculture infrastructures for excellence in European fish research (AQUAEXCEL)
  - Programme:** FP7, Capacities, Research Infrastructures
  - Instrument:** Combination of Collaborative projects and Coordination and Support Actions (CP-CSA)
  - Duration:** March 2011 – February 2015 (48 Months)
  - Coordinator:** Institut National de la Recherche Agronomique (INRA), FRANCE
  - Consortium:** 17 partners from 10 countries
- News:** A section titled 'AQUAEXCEL's Key Achievements 2013-2014' with a 'Read more' link.
- Intranet (partners only):** A section with a 'LOG IN' button and the text 'Best viewed in Internet Explorer'.
- Video:** A video player showing a play button and the text 'An introduction to the AQUAEXCEL project from AquaTT on Vimeo.'

# AQUAEXCEL products

## The RI map: identify your partner infrastructure(s)

The screenshot displays the AQUAEXCEL website's interactive map. The top navigation bar includes links for Home, The Project, Results, Consortium, Call for Access, Interactive map, Training Courses, Events, Links, Glossary, Media Centre, and Search. The main heading is "European Aquaculture Research Infrastructures interactive map".

A detailed information popup for a specific infrastructure is shown, titled "Research Infrastructure". The popup includes the following information:

- Info** (selected tab)
- Expertise**
- Main Species**
- Type of Sites**
- Type of Water**

**INRA-IERP**  
[http://www6.inra.fr/experimentation\\_sante\\_animale/Les-unites-experimentales/L-unite-experimentale-Infectiologie-Experimentale-des-Rongeurs-et-Poissons](http://www6.inra.fr/experimentation_sante_animale/Les-unites-experimentales/L-unite-experimentale-Infectiologie-Experimentale-des-Rongeurs-et-Poissons)  
Domaine de vilvert Bat 234, 78350 JOUY EN JOSAS / France

**Operating Institution (legal entity owning the Research Infrastructure)**  
**Institut National de la Recherche Agronomique**  
[www.inra.fr](http://www.inra.fr)

**FOR MORE INFORMATION - CLICK HERE**

A "Map legend" popup is also visible, detailing the symbols used on the map:

- Research Infrastructures open for Trans National Access (in AQUAEXCEL)**
  - University (red building icon)
  - Industry (blue building icon)
  - Research Institute (green building icon)
  - Other (purple building icon)
- Other Research Infrastructures**
  - University (red building icon)
  - Industry (blue building icon)
  - Research Institute (green building icon)
  - Other (purple building icon)

The map shows various countries and regions, with markers indicating the location of research infrastructures. The map is powered by Google Maps.

Currently 108 entries

Interactive menu

Searchable

Detailed information available

You can still register!



## ATOL / FOL ontologies

<http://www.aquaexcel.eu/ontology.com/>

[Visualisation-fr](#)

**Deliverable 3.2**  
**Best practices & cross-applicability of methods to measure phenotypes**

Due date of deliverable: M24  
 Actual submission date: M26  
 Start date of the project: March 1<sup>st</sup>, 2011  
 Organisation name of lead contractor: ULPGC  
 Revision: Bendik Fyhn Terjesen  
 Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013) Determination Level

IPU Public  
 IPR: Reserved to other organisations/partners (including the CP)  
 IFR: Reserved to 3 groups specified by the consortium (see table)  
 IFO: Confidential, only for members of the consortium (incl. CP)  
 ICD: Confidential, only for members of the consortium (incl. CP)

Link Table 2

Identifiant	ATOL.0001658	GM6
Name of Trait:	Condition factor	
Definition:	Indicator of the stoutness of an animal, obtain using the formula $K = (\text{body weight}[\text{g}]) / (\text{body length}[\text{cm}]^3) \times 100$ .	
SIMILAR TO, if it's appropriate, in connection with other identifiers number		
MEASUREMENT METHOD:	Condition factor = $K = (\text{body weight}[\text{g}] / (\text{body length}[\text{cm}]^3) \times 100$ Where body length corresponds to the fork length (ATOL:0001658) and body weight (ATOL:0000351) to the total weight of the fish after draining.	
MATERIAL (biological, reagents & instrumental):	A scale (accuracy of 0.1 g) Measuring board (accuracy of 0.1 cm)	
UNIT AND RANGE OF VALUE:	Length in cm: weight in gram, the condition factor is around 1 (0.5-3) (no unit)	
PARAMETERS TO MEASURE:	Fork length of the fish Body weight of the fish	
BIBLIOGRAPHIC REFERENCES:	Nash, R.D.M., Valencia, A.H., Geffen, A.J., 2008. The Origin of Fulton's Condition Factor. Setting the Record Straight. Fisheries 31, 238-239. (http://folk.uib.no/nifag/nifag/reprints/Nash%2006Fisheries.pdf).	
SYNONYMS EXACT:	Fulton index, condition factor, K	
OTHER ASPECTS TO INCLUDE:	Depending on the fin integrity the standard length (ATOL:0001658) could be used instead of the fork length.	
RESEARCHER CONTRIBUTION (and date of the last modification):	Åsa Maria Espmark (NOFIMA) Bendik Fyhn Terjesen (NOFIMA) Léa Joret (INRA) Pierre-Yves Le Bail (INRA) Jaime Pérez-Sánchez (CSIC) (20/06/13)	

Link Table 2

+ measurement methods for 63 major traits

## Advanced training courses

RAS technology @ Wageningen



Aquaculture Genomics @ INRA



Chromosome manipulations  
@ Stirling



New Monitoring Tech @ NTNU



# TRANSNATIONAL ACCESS: all major EU fish species



# TRANSNATIONAL ACCESS: all types of infrastructures

The collage illustrates various aquaculture infrastructures across Europe. The map shows the following locations and their associated infrastructure types:

- NOFI IMB** (Norway): RAS and Flow-through systems.
- WU** (Austria): RAS and Flow-through systems.
- IT** (Italy): RAS and Flow-through systems.
- ULPGC** (Spain): RAS and Flow-through systems.
- HCMR** (Vietnam): Cages.

The pie chart legend identifies the infrastructure types:

- ponds (orange)
- broodstock (yellow)
- hatchery (red)
- Flow-through (green)
- RAS (purple)
- cages (blue)

Other visible infrastructure types in the collage include ponds, broodstock, hatchery, cages, RAS, and Flow-through systems.




# AQUAEXCEL research

AQUAEXCEL e-Infrastructure site

Home IMARES Nofima NTNU SINTEF WU Help Admin

Welcome to the AQUAEXCEL e-Infrastructure site




AQUAEXCEL will provide the European aquaculture research community with a platform of top class research infrastructures, see the AQUAEXCEL website for detailed information.

AQUAEXCEL will integrate, on a European scale, key aquaculture research infrastructures, in order to promote their coordinated use and development. Through collaboration among 17 partners and 23 facilities, AQUAEXCEL offers research infrastructures for both basic and applied research and it will provide the necessary instruments to make better tools available for aquaculture research.

**The site is used for technology testing, and is subject to changes.**

The AQUAEXCEL facilities available through the e-Infrastructure:

- IMARES
- Nofima
- NTNU
- SINTEF
- WU-Aquaculture and Fisheries Group



IMARES



NOFIMA



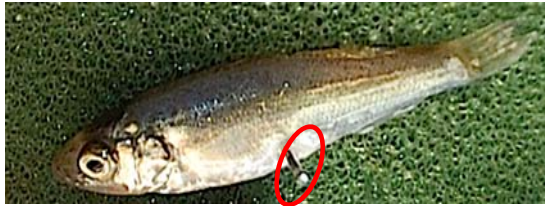
SINTEF/ACE



WUR



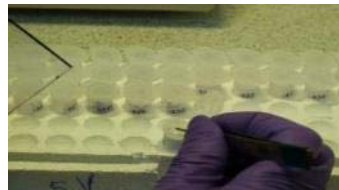
## Individual identification in sea bass & sea bream



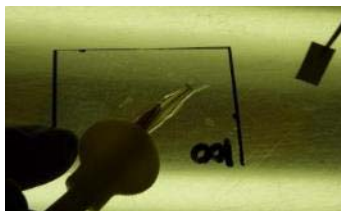
Insertion of the NonaTech tag after piercing the abdominal cavity and on a 400 mg juvenile seabass



- Survival OK for BW>400 mg
- No effect on growth
- Effect on swimming behaviour (disappears after 42 days)
- Reading success >80%



Cutting of inferior part of caudal fin and storage in ethanol



Sampling mucus & epithelium cells on Whatmann paper and storage in Ependorff at -20° C



Early individual electronic identification of sea bass using RFID microtags: A first example of early phenotyping of sex-related growth

Sébastien Ferrari<sup>ab</sup>, Béatrice Chatain<sup>bc</sup>, Xavier Cousin<sup>ad</sup>, Didier Leguay<sup>a</sup>, Alain Vergnet<sup>e</sup>, Marie-Odile Vidal<sup>c</sup>, Marc Vandeputte<sup>cf</sup>, Marie-Laure Bégout<sup>ab\*</sup>

<sup>a</sup> Génomex, Ifremer, Guelin, BP 7, 17137 L'Yeu-Meuilly, France  
<sup>b</sup> UMRI 1010/IRCEP, Génomex, Ifremer, BP 50910, Nantes, France  
<sup>c</sup> Génomex, Centre de Métagénomique, 34250 Palavas-les-Bains, France  
<sup>d</sup> INRA UR1275, Campus de St-Jean, 35142 Rennes, France  
<sup>e</sup> INRA UR1081, 17137 Guelin, France

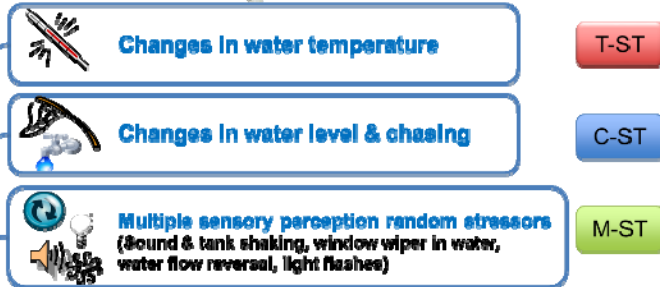
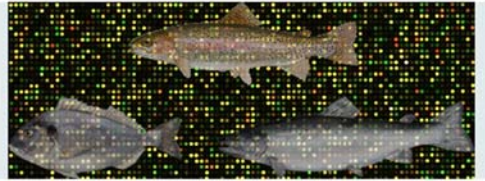
# AQUAEXCEL research: better monitoring of fish adaptability

## Fish and Chips

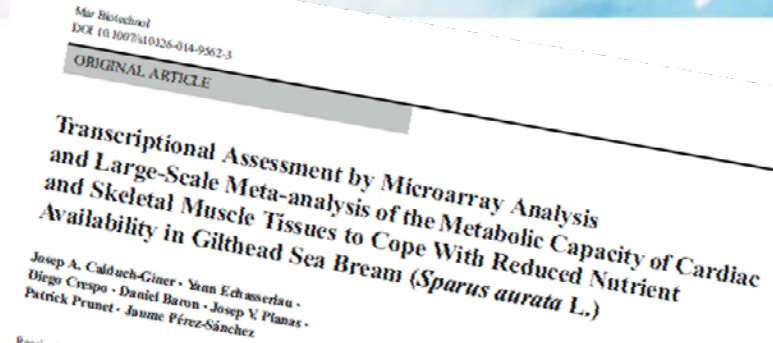
Fish transcriptome database

### Fish and Chips :

Fish and Chips database gathers public transcriptome data related to fish species in various physiological conditions



MITO-chip



Dietary oils mediate cortisol kinetics and the hepatic mRNA expression profile of stress-responsive genes in gilthead sea bream (*Sparus aurata*) exposed to crowding stress. Implications on energy homeostasis and stress susceptibility

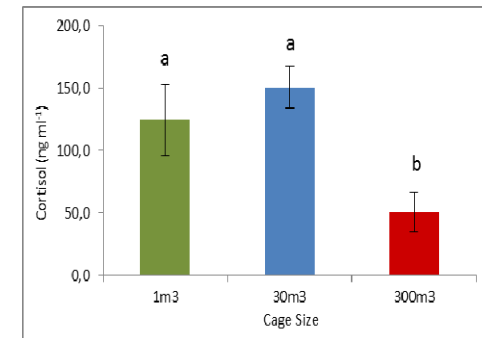
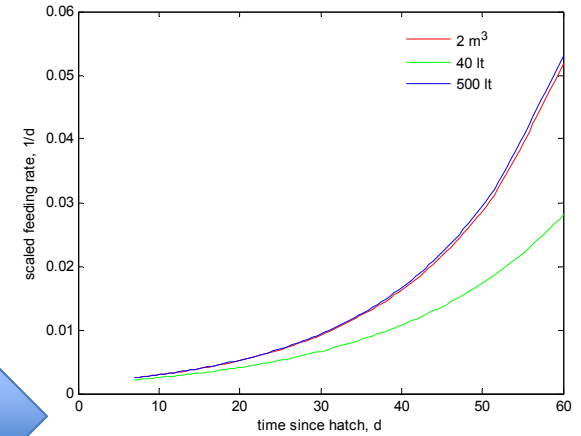
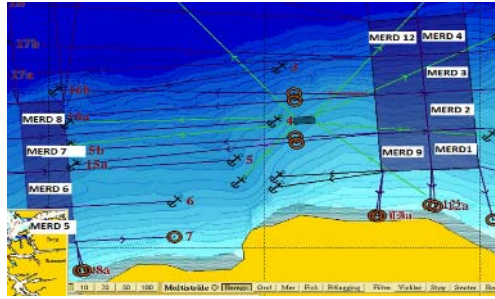
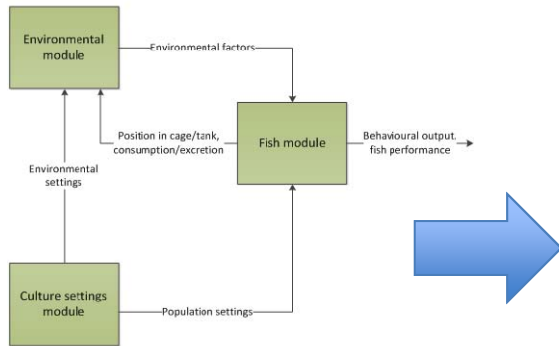
Jaume Pérez-Sánchez <sup>a,\*</sup>, Míriam Borrel <sup>a</sup>, Azucena Bermejo-Nogales <sup>a</sup>, Laura Benedito-Palos <sup>a</sup>, Alfonso Saera-Vila <sup>a</sup>, Josep A. Calduch-Giner <sup>a</sup>, Sadasivam Kaushik <sup>b</sup>

<sup>a</sup> Nutrigenomics and Fish Growth Endocrinology, Instituto de Acuicultura Torre de la Sal, IATS-CSIC, Castellón, Spain  
<sup>b</sup> INRA, UR1067 NuMeA Nutrition, Metabolism Aquaculture, F6-4310 Saint Pée-sur-Nivelle, France





# AQUAEXCEL research: Effect of experimental unit size on results



## AQUAEXCEL research: Production of isogenic lines

Gynogenesis and androgenesis → stable, « pure » lines

→ reproducible experiments / identification of genes

→ already available



## CONCLUSION

- We made 17 partners work together and share their practices
- Organized cutting edge training courses
- Permitted > 80 research projects in Transnational Access
- Produced essential outputs for more efficient research:
  - Easily accessible information on aquaculture RIs
  - Animal traits and environmental ontologies
  - Phenotyping methods database
  - Remote access protocols to aquaculture Ris
  - Evidenced / modelled effect of experimental unit size
  - Better / non lethal / more informative phenotyping
  - Basis for isogenic lines of sea bass/salmon/carp

➔ For the benefit of the EU aquaculture research community and industry

## WHICH FUTURE ?

Follow-up project AQUAEXCEL<sup>2020</sup> submitted in September:

- Strong industry involvement via EATIP
- Will finance >170 TNA projects over 5 years (be ready !)
- Organizing data (« the Digital Fish ») with EMBRC & ELIXIR
- Support for industry transfer of the best JRA and TNA outputs
- Virtual aquaculture research infrastructures for *in silico* experiments
- Effects of fish life history on experimental outputs
- Characterization and use of isogenic fish lines
- Nano-sensors for remote monitoring of experimental fish

The answer in January 2015!



Would you like to find out more?



**AQUAEXCEL INDUSTRY WORKSHOP:**  
Research Infrastructures: adding value to  
European aquaculture industry

Friday, 17<sup>th</sup> October  
Kicking off at 10.30am  
Room 11 (Exhibition Area)

**See you there!**



Contact us

**Thank you for your attention**

Email: [marc.vandeputte@jouy.inra.fr](mailto:marc.vandeputte@jouy.inra.fr)

Website: [www.aquaexcel.eu](http://www.aquaexcel.eu)

Tel: +334 67 13 04 07



# DISCLAIMER



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