



# Integrated analytical services in the frame of METROFOOD-EPI project: AUTH contribution to lipid analysis

N. Nenadis<sup>1</sup>, A. Kalogeropoulou<sup>1</sup>, P. Alvanoudi<sup>1</sup>, N. P. Kalogiouri<sup>2</sup>, M. Z. Tsimidou<sup>1</sup>, C. Zoani<sup>3</sup>

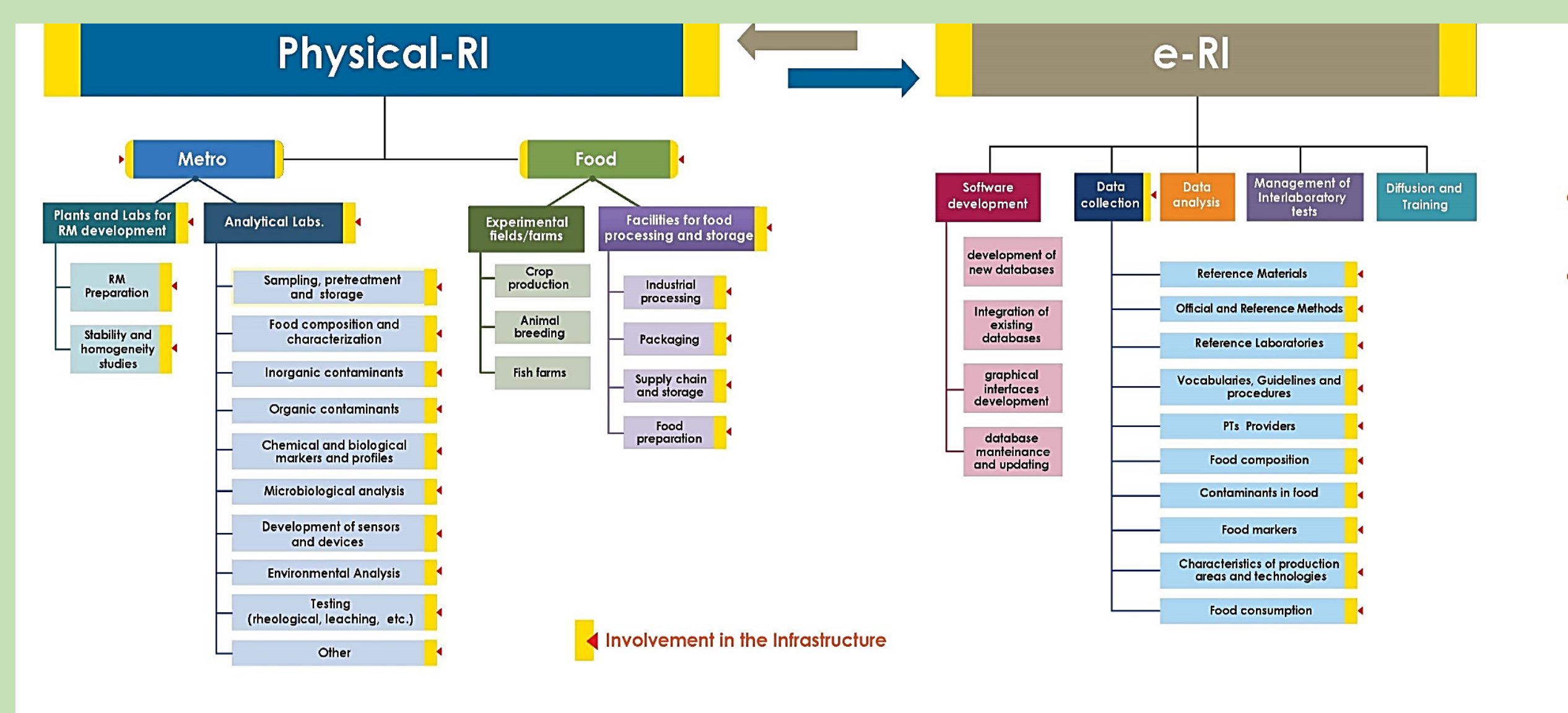
<sup>1</sup>AUTH (Aristotle University of Thessaloniki), School of Chemistry, Lab. Food Chemistry & Technology, GR-54124; <sup>2</sup> ibid, Lab. Analytical Chemistry;

<sup>3</sup>ENEA, Italian National Agency for New Techn., Energy & Sustainable Economic Development, Dept. for Sust., Biotechn. & Agroindustry, Casaccia Research Center, 00123, Rome, IT

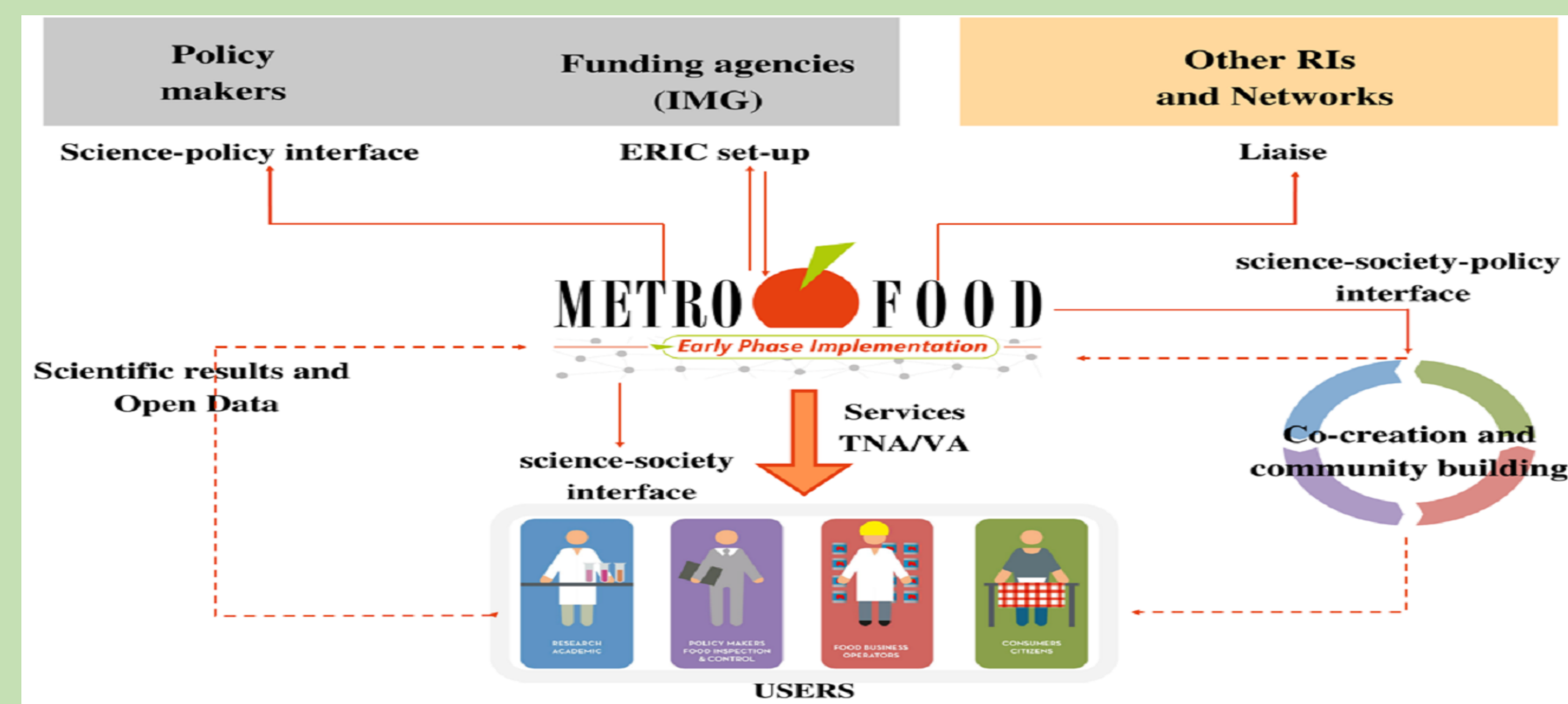
## METROFOOD-RI

A distributed *Research Infrastructure for Promoting Metrology in Food & Nutrition* ([www.metrofood.eu](http://www.metrofood.eu)) enhancing scientific excellence in food quality & safety. It provides high-quality metrology services in food & nutrition, comprising an important cross-section of highly interdisciplinary & interconnected fields throughout the food value chain, including agrifood, sustainable development, food safety, quality, traceability & authenticity, environmental safety & and human health. It combines a *Physical-RI* & an *electronic-RI* with numerous facilities distributed in 13 EU member states & associated countries. Since 2015, this effort has been supported by the EU & other organizations that will use the RI's services once the legal status of the ERIC (European Research Infrastructure Consortium) will be granted (Tsimidou et al., 2022). The RI entered the *early phase implementation (EPI)* since the January 1<sup>st</sup>, 2024 supported by Horizon Europe (GA 101130162).

## METROFOOD-RI FACILITIES



## INTERACTIONS WITH EXTERNAL ACTORS



## METROFOOD-EPI TRANSNATIONAL ACCESS TO USERS

Considering its role as service-oriented organization toward possible users such as researchers & academic communities, policy makers/food inspection & control agencies, food business operators (FBOs) & consumers/citizens, **competitive open calls** were launched (<https://www.metrofood.eu/access/open-call.html>) to provide transnational access (TNA) with physical & remote access to selected proposals based on excellence.

**Two use cases** have been selected in full alignment with the core objectives of METROFOOD-RI, the service chart developed during the Preparatory Phase & the expertise within the project partners & keeping key EU policies & objectives in the foresight.

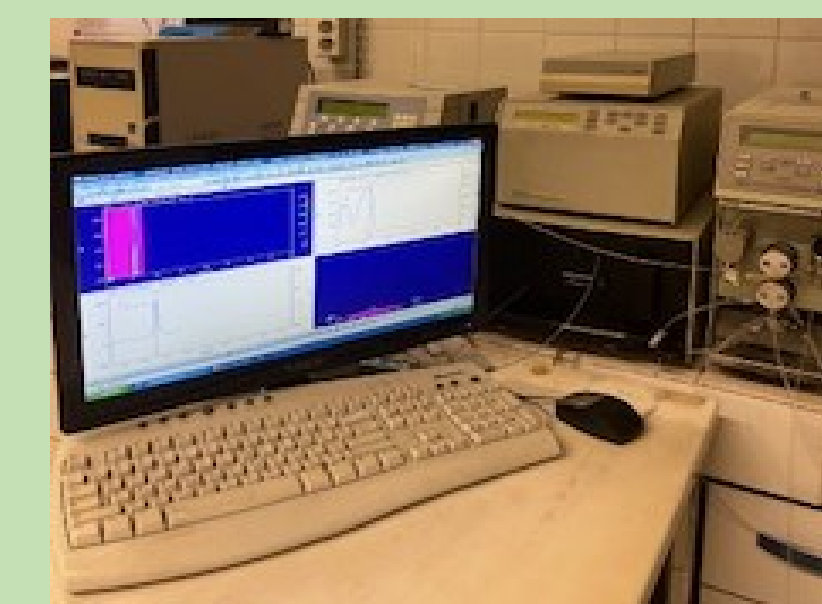
## AUTH contribution to the METROFOOD-EPI Open Call (Use case 2)

**Use case 2: Pilots for food production and integrated analytical services** was directed towards the use of food by-products (e.g., from cereals) for preparing new food ingredients & products. Two projects were selected aiming at exploiting (1) rice bran and (2) almond okara as ingredients in wheat breads to obtain new safe formulations of sensorial acceptability & nutritional value.

AUTH was one of the 6 analytical service providers involved in both projects.

AUTH participated with:

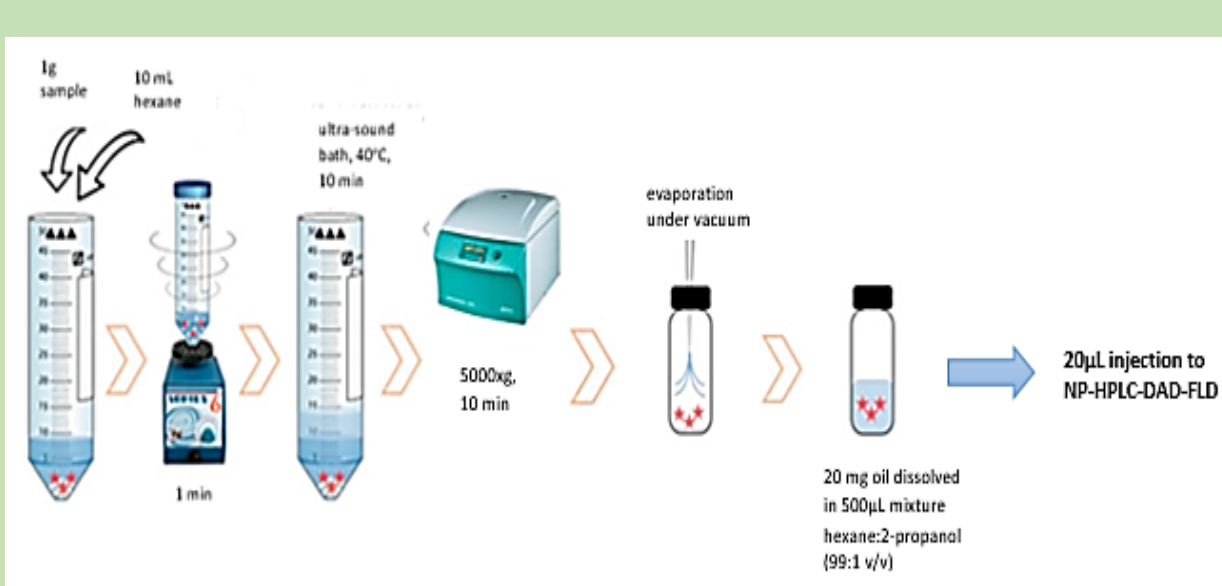
NP-HPLC-DAD-FLD (tocopherol &  $\gamma$ -oryzanol analysis, Lab Food Chemistry & Technology) & GC-FID (fatty acid analysis, Lab. Analytical Chemistry)



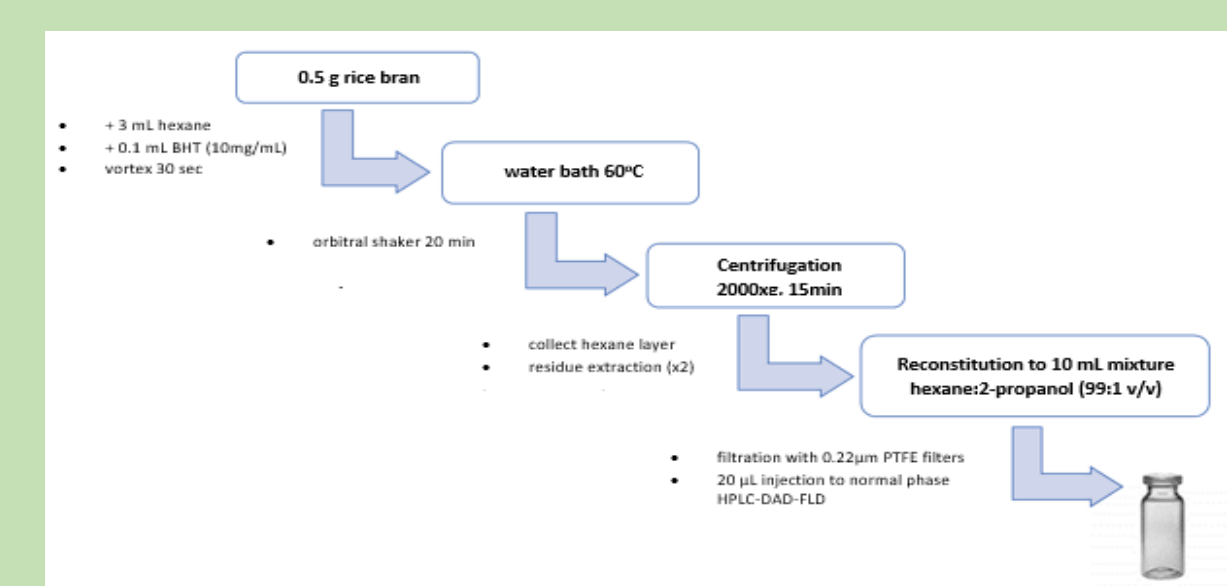
## The quest for VALIDATED ANALYTICAL PROTOCOLS appropriate for the specific matrices



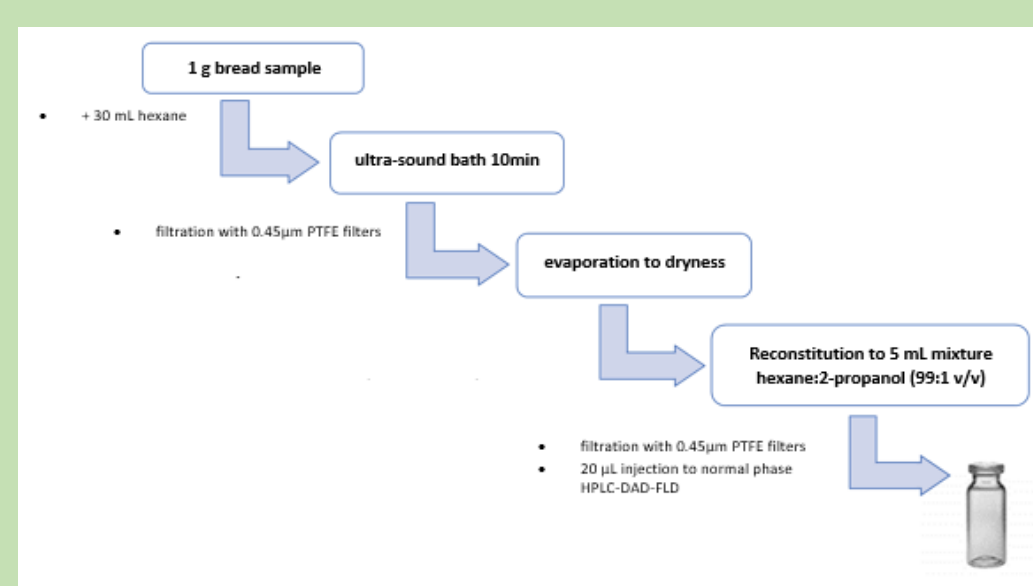
- For the selection of the appropriate extraction protocols a **detailed literature review** was performed.
- The protocols selected were suitable for the analysis of each sample and validated in terms of **linearity** (regression analysis, residual chart), **limit of detection** (LOD (3 S/N)), and **quantification** (LOD (10 S/N)).
- The protocols for the extraction & analysis of **tocopherols** from **almond & okara** as well as the analysis of **fatty acids** were accomplished according to previous publications from members of AUTH team (Psomiadou & Tsimidou, 1998; Kalogiouri et al., 2021 & 2022), while the analysis of **rice bran** was carried out according to Huang & Ng (2011). Bread samples were treated according to Jensen et al. (2011) & extracts were analyzed with the above protocols.



Tocopherols extraction protocol from almond & okara, (Kalogiouri et al., 2021)



Tocopherols and  $\gamma$ -oryzanol extraction protocol from rice bran, (Huang & Ng, 2011)



Tocopherol &  $\gamma$ -oryzanol extraction protocol from bread samples, (Jensen et al., 2011)

- Elution of target analytes in HPLC was **isocratic** (99:1 v/v *n*-hexane:isopropanol, flow rate: 1.1 mL/min) and chromatograms were recorded at  $\lambda_{ex}$ 294 nm/ $\lambda_{em}$ 330 nm with a **fluorescence detector (tocopherols)**, whereas for  $\gamma$ -oryzanol at 325 nm with a **DAD** connected in line
- Fatty acid methyl esters were prepared using 14% BF<sub>3</sub> after alkaline hydrolysis (0.5 M NaOH, 80 °C) and analyzed with a **GC-FID** following a temperature program (46 °C - 240 °C)

## FUTURE PROSPECTS

- AUTH contribution to TNA services may add to the expansion of the RI reach to accommodate more complex, high-priority applications with the involvement of more service providers.
- Engagement with SMEs may facilitate technology transfer, economic growth & promote the adoption of sustainable practices & metrology in the food sector.

## References

Huang & Ng, (2011), J. Chromatogr. A, 1218(29), 4709-4713, Jensen et al. (2011) LWT, 44(3), 637-642, Kalogiouri et al., 2021, Molecules, 26(18), 5433, Kalogiouri et al. (2022), Food Anal. Methods, 15, 761-771, Psomiadou & Tsimidou (1998), J. Agric & Food Chem., 46(12):5132, Tsimidou et al. (2022), Foods, 11(4):599.

## Acknowledgements

Research was funded by the METROFOOD-EPI project (HEu, GA No 101130162). The project 'Dissemination & further Use of Research Achievements of the Laboratory of Food Chemistry & Technology, School of Chemistry AUTH' (AUTH Research Committee code 96677) is acknowledged for financial support of the current participation.



Funded by  
the European Union

