

Tracing Phytochemicals from Farm to Fork. The Irish Phytochemical Food Network.

Valverde¹, J. Brunton¹, N. Gaffney², M. Cummins³, E. Tuohy⁴, M. O'Brien⁵, N. O'Beirne⁶, D. Martin-Diana⁷, A.B. Barry-Ryan⁷, C. ¹Teagasc, Ashtown Food Research Centre, Ashtown, Dublin 15, ²Teagasc, Kinsealy Research Centre, Malahide Road, Dublin 17. ³School of Agriculture, Food Science and Veterinary Medicine, University College Dublin, Earlsfort Terrace, Dublin 2. ⁴Department of Biochemistry, NUI, Galway, Galway City. ⁵Department of Food and Nutritional Sciences, University College Cork. ⁶Department of Life Sciences, University of Limerick. ⁷Dublin Institute of Technology, Cathal Brugha Street.

Background

Evidence is emerging that some of the beneficial health effects of consuming a diet rich in fruits and vegetables is due to the presence of bioactive compounds known as phytochemicals. A variety of Irish grown fruits and vegetables contain these phytochemicals in amounts which could have a beneficial effect to human health. At the present time there are a significant number of nationally and internationally funded research projects ongoing in Ireland examining the effects of many different factors on levels of biologically active compounds in vegetables. However the mechanisms of action, stability during food processing, effect of agricultural factors and stability in post harvest storage of these compounds are not well understood. Thus an integrated *Irish Phytochemical Food*, focused on three groups of phytochemicals which are commonly found in the commercially grown Irish vegetables was set up early this year.

The main objective of this network is to fill the urgent need to assemble existing knowledge and provide holistic information on the fate of these compounds right up to their site of biological action (see Figure 1). This network is comprised of experts from **Teagasc**, Dublin Institute of Technology (**DIT**) and several Irish universities including University College of Cork (**UCC**), University College of Cork (**UCD**), National University of Ireland in Galway (**NUI Galway**) and University of Limerick (**UL**) and is funded by the Department of Agriculture and Food through the Network and Team Building Initiative of the Food Institutional Research Measure (**FIRM 06/NITAFRC06**). The combined expertise of this group will serve to develop critical mass and an internationally recognised network of experts.

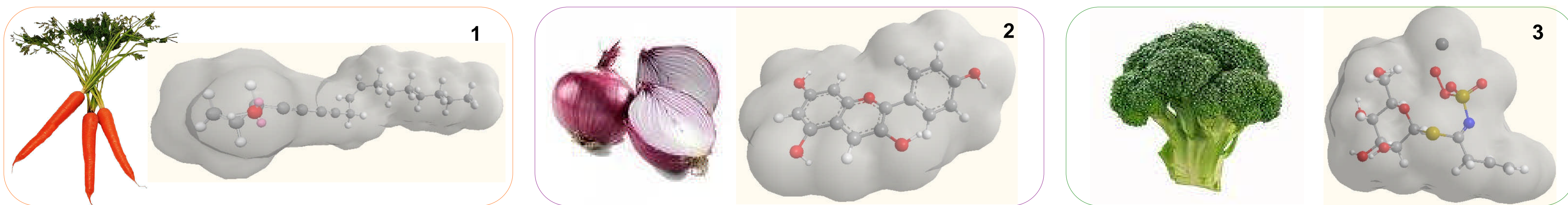


Figure 1. Three commercially grown Irish vegetables (source Bord Bia) with the respective 3D model representation of phytochemicals commonly found in each of the groups: 1. *Daucus Carota* L. and Falcarinol (polyacetylenes), 2. *Allium Cepa* L. and Pelargonidin (Flavonoids); 3. Image of *Brassica Oleracea* L. and Sinigrin (Glucosinolates).

Objectives

1. Manage, administrate and develop critical mass and an internationally recognised network of experts on tracing phytochemicals in Irish fruits and vegetables from farm to fork.
2. Develop a world class portfolio of methods to assess the phytochemical and bio-active status of Irish grown fruits and vegetables.
3. Gather existing information and generate new data on the effect of agronomic factors and post harvest storage on the levels of phytochemicals in Irish grown fruits
4. Produce optimised protocols for phytochemicals retention during food processing.
5. Develop a probabilistic exposure models for dietary intake and bio-availability of phytochemicals of Irish grown fruits and vegetables.
6. Generate, screen, develop and test (**GSDT**) innovative ideas for new product development (**NPD**). Sensory Analysis from the NDP and investigate consumer attitudes to new innovative products emerging from these studies.
7. Disseminate outputs from the network to the prepared fruit and vegetable Industry (growers, processors, and retailers) in an easy understood ready to understand format. Ensure effective exploitation of intellectual property generated as part of the networks activities and facilitate effective dissemination of outputs to industrial partners.

Methodology

The creation of the network seems to be the better approach to achieved the above mentioned objectives because, (a) network generates action in each research field, (b) network members can assist in dissemination of the outcomes and (c) network approach facilitates the management of the overall project.

The workprogramme for the network (Figure 2.) has been divided into 7 Workpackages (**WP**). Each workpackage is a specific step of the "total food chain". Different research groups have responsibility for each WP (see Figure 2).

- WP1.** Administration and development network.
- WP2.** Analysis, toxicology and bio-assay development
- WP3.** Effect of agronomic and postharvest storage
- WP4.** TTT & PPP
- WP5.** Dietary Intake & Bioavailability studies
- WP6.** New product development
- WP7.** Dissemination of outcomes

- ARFC**
- ARFC, DIT, UCC, NUIG**
- ARFC, Teagasc Kinsealy**
- UL, ARFC**
- UCD**
- ARFC, DIT, UL**
- ALL PARTNERS**

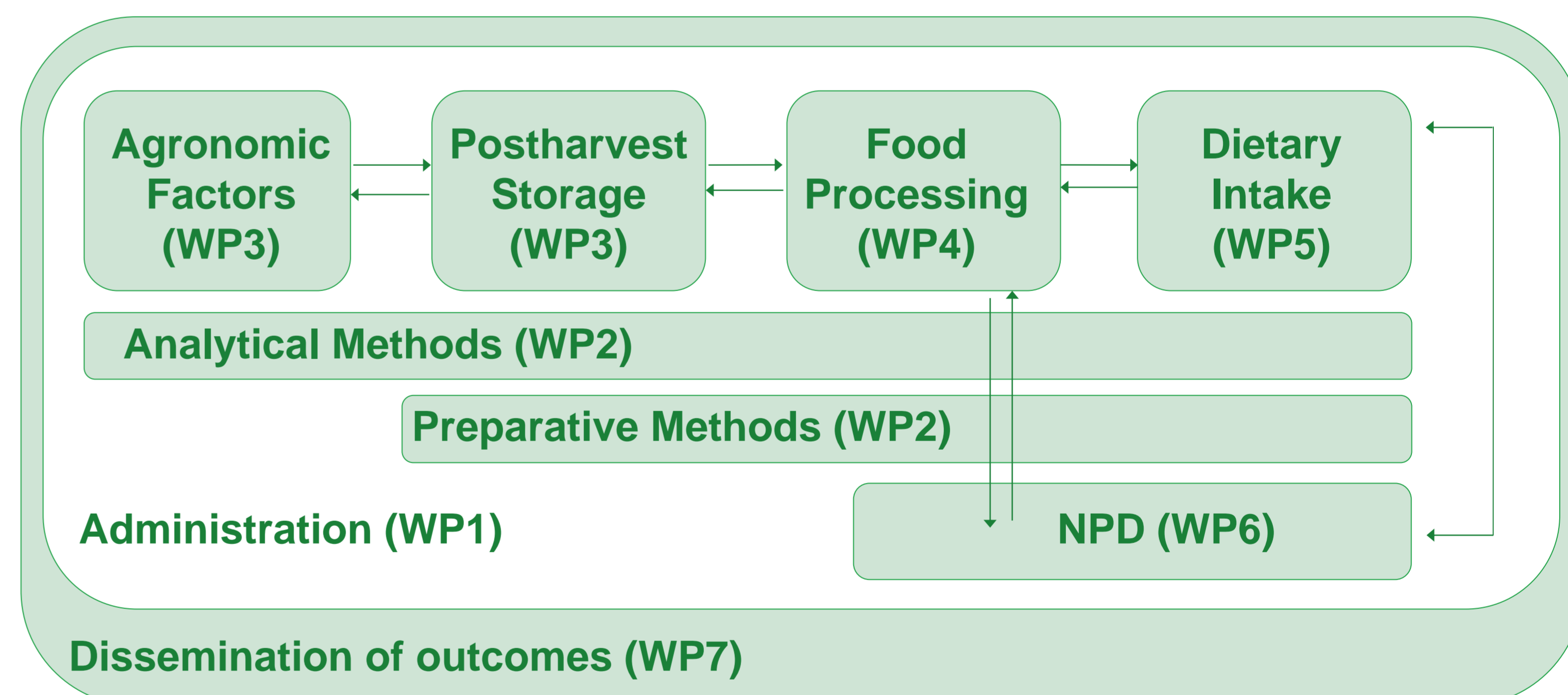


Figure 2. Flow diagram of the "farm to fork" chain and their associated workpackages.

Dissemination

The dissemination of outcomes will require considerable input from all network partners. Effective communication between all partners and stakeholders will be essential to achieve this end. This is why the dissemination strategy is divided in two groups of action; firstly, the **internal communications**, they aim to facilitate the interaction between network members to exchange preliminary observations, theoretical assumptions, methods, products, materials, results and conclusions on the different subjects studied. This maximises the scientific and technological work of the partners and leads to innovation. Secondly the **external communications**, they aim to create social awareness of the Irish phytochemical food network in both scientific and large audience domains. As can be seen in Figure 3, the **external communications** are sub-divided to meet the needs of the potential receiver of the information.

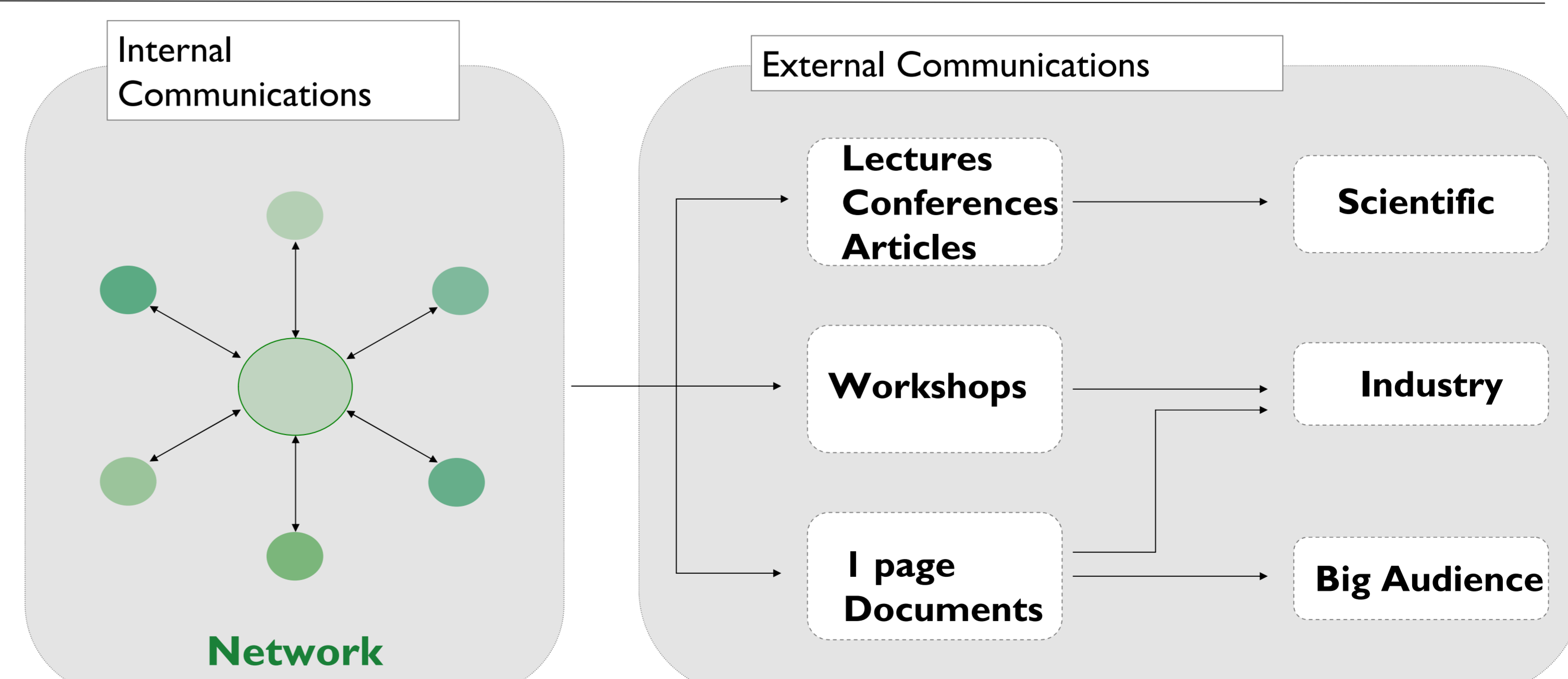


Figure 3. Schematic of the channels and targets of the communications strategy of WP7.

Funding Body:

Funding provided under the NDP, through the FIRM, administered by the Department of Agriculture, Fisheries & Food.



Members:

