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Horizon 2020
INFRADEV-1-2014 - Design studies

RICHFIELDS Working Package 4
Deliverable D4.4

Open Architecture Platform Design – initial concepts

Date delivered:
M26

Authors:
Charo Hodgkins, Lada Timotijevic, Lan Ge

Deliverable lead beneficiaries:
USURREY/ Wageningen Economic Research

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654280.

Project	
Project acronym:	RICHFIELDS
Project full title:	Research Infrastructure on Consumer Health and Food Intake for E-science with Linked Data Sharing
Grant agreement no.:	654280
Project start date:	01.10.2015
Document:	
Title:	Open Architecture Platform Design – initial concepts
Deliverable No.:	D4.4
Authors:	Charo Hodgkins, Lada Timotijevic, Lan Ge
Reviewer:	Karin Zimmermann – Project Coordinator prof. dr. ir. Pieter van't Veer – Scientific Coordinator
Start date:	01.09.2016
Delivery date:	09.11.2017 (M26)
Due date of deliverable:	31.07.2017 (M22)
Dissemination level:	CO
Status:	Final

Change history:		
Version	Notes	Date
001	First outline draft	29.06.2017
002	Revisions addressing quality control feedback from K. Zimmerman, H. van der Veen & P. van 't Veer	13.09.2017
003	Revisions addressing 2nd round of quality control feedback from K. Zimmerman, H. van der Veen & P. van 't Veer	12.10.2017
004	Addressed final comments from P van 't Veer	09.11.2017

Karin Zimmermann

Project Coordinator

Prof Pieter van 't Veer

Scientific Coordinator

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Summary

The vision of the RICHFIELDS project is to design an **Open Architecture Data Platform** to collect, align and share consumer, business and research data in order to provide the scientific research community with innovative data sets and the ability to generate new knowledge in the consumer food and health domain. Furthermore, the new knowledge generated as a result of the data platform will enable policymakers and other stakeholders to develop, evaluate and implement effective food and health strategies at the level of both individuals and populations. It is proposed that the data platform will provide an unprecedented opportunity to address the determinants of consumer behaviour relevant to food and health across three distinct instances of behaviour: purchase, preparation and consumption. By building on the 'DI' components of the proposed DISH-RI (www.eurodish.eu), the design proposal arising from the RICHFIELDS project will be an important building block for subsequently constructing an ESFRI roadmap proposal for a pan European FNH-RI.

This deliverable introduces a conceptual framework in the form of a 'Core Offering Proposal' for the data platform complemented by a three- stage development process approach; 'Core', 'Growth' and 'Maturity' as a means to support decision making in Phase 3 of the project. Based on the findings to date, it outlines the elements that the data platform could potentially include in terms of data and services and will facilitate the necessary focused decision making within the Phase 3 work-plan to achieve the overall project objectives for a sustainable structure, governance and business model.

In order to develop the Core Offering Proposal into a detailed specification it is proposed that initial consideration by Phase 3 is given to answering the following 4 questions as a priority:

1. What data can be readily incorporated into the data platform at the MVP level from an availability/ethical perspective?
2. Are these data of sufficient value to the proposed primary users; If not how will the additional data required be obtained?
3. Is there a sufficient value offering for data providers to ensure access to the data required?
4. Which stakeholders are essential to form the MVP/MVE ensuring appropriate levels of Governance and User engagement?

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1. Introduction

The vision of the RICHFIELDS project is to design an **Open Architecture Data Platform** to collect, align and share consumer, business and research data in order to provide the scientific research community with innovative data sets and the ability to generate new knowledge in the consumer food and health domain. Furthermore, the new knowledge generated as a result of the **data platform** will enable policymakers and other stakeholders to develop, evaluate and implement effective food and health strategies at the level of both individuals and populations.

It is proposed that the data platform will provide an unprecedented opportunity to address the determinants of consumer behaviour relevant to food and health across three distinct instances of behaviour: **purchase, preparation and consumption**. By building on the 'DI' components of the proposed DISH-RI (www.eurodish.eu), the design proposal arising from the RICHFIELDS project will be an important building block for subsequently constructing an ESFRI roadmap proposal for a pan European FNH-RI.

The first two phases of the project (Phase 1 WP5-7; Phase 2: WP8-10) are delivering in depth knowledge on the type, quality and other key characteristics of available data from consumers, industry, other RIs and laboratories for potential inclusion into the data platform. From this the future requirements for the data platform, in the form of a specification, will then be developed by the third phase (Phase 3: WP11-13). The RICHFIELDS project includes extensive user and stakeholder engagement activities and the outcome of these will be fully reported in the separate deliverables associated with those activities (c.f. Phase 1, Phase 2 and WP3 deliverables) however, initial evaluation of the empirical evidence emerging from Phase 1 and Phase 2, and the outcomes of the two stakeholder workshops performed thus far have identified a number of very relevant issues supporting the need for the conceptual approach being presented in this deliverable:

- ***Visualizing the data platform:*** *Potential users/stakeholders both in the research and commercial domains find it difficult to visualise what the data platform will be (what it will look like/consist of). They would benefit from a more focused visualisation of the platform to engage with. In turn, this would enable clearer identification of the potential motivators and barriers to their future collaboration with the proposed open architecture data platform.*
- ***Phased development:*** *Different users/stakeholders want different things from the data platform and whilst it may be possible to satisfy them all in the longer term, in the shorter term focusing on a primary user group for the core offering is an essential starting point. Additional users can then be considered and addressed in terms of their potential for inclusion as and when it becomes feasible (i.e. Growth phase).*
- ***Added value beyond data platform:*** *The proposed design needs to be more than simply a data platform and users/stakeholders from within both the public sector research community and the commercial community have indicated that there is considerable value for them in being able to access services and authoritative materials/standards related to big data and research best practice within the lifestyle, food behaviour and dietary assessment domains. In order to link and utilize data from different sources to stimulate high-quality research, a level of standardization is required. This includes standardization of vocabulary and*

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development of thesauri to describe the data provenance and its quality, the development of ontologies and semantic data models for connecting data and the establishment of best practice protocols to support the research activities utilizing connected data. All of these are of value to the users both in terms of data providers and data users. In addition, the linking of hard infrastructures elements as such as sensory labs, virtual supermarkets and other experimental facilities is desirable.

2. Objectives

This deliverable (D4.4) introduces a conceptual framework in the form of a 'Core Offering Proposal' for the data platform complemented by a three- stage development process approach; 'Core', 'Growth' and 'Maturity' as a means to support decision making in Phase 3 of the project. Based on the findings to date, it outlines the elements that the data platform could potentially include in terms of data and services and will facilitate the necessary focused decision making within the Phase 3 work-plan to achieve the overall project objectives for a sustainable structure, governance and business model.

Within the overall project, WP4 is responsible for facilitating the empirical work within Phase1 (Consumer data) and Phase 2 (Business, RI and Laboratory data), in order to optimize usability of their results by Phase 3. The purpose of this deliverable is to outline the initial concepts for the proposed data platform. These concepts will then need to be extensively evaluated and refined by Phase 3 in order to progress to the final design specification.

3. Results

3.1 Staged approach for the Data Platform development (Core, Growth and Maturity)

The development of digital platforms is known to be complex[1,2,3]. It is fair to say that development of data platform resulting from the RICHFIELDS project will be both complex and ambitious and effective implementation will depend on focusing activities particularly in Phase 3 on evaluating data and services that are considered essential to users for the initial start-up viability of the offering (i.e. must haves). However, the potential for adding data and services to grow the offering and continually move forward towards the ultimate vision of a fully mature and integrated data platform must also be fully considered and addressed throughout the design process to ensure its future ongoing sustainability. Design is not a static process and even after launch the data platform will need to be continually grown and enhanced to ensure it continues to meet the needs of users and encourages participation by a wider group of data providers.

Throughout the Phase 3 design process, complex decisions will need to be made about what can be achieved in the shorter term and what perhaps will need to be deferred to a later stage. It is therefore propose that the development of the platform is addressed and conceptualised in a staged manner (Fig. 1);

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- The **core offering** proposal stage within which potential elements of the platform design are identified and included. Using a 'Core Offering' proposal as a starting point will enable the development of initial business and governance models and the specification of a potential entry level data platform in the form of a **Minimum Viable Product (MVP)** and the **Minimum Viable Ecosystem (MVE)** required to sustain it.
    - The **MVP i**s defined as here as the minimum set of data, tools and services required to satisfy the primary user group.
    - The **MVE** is defined as the minimum set of users and data providers and the governance structure that is necessary to sustain the MVP. A platform is more than a collection of technological functionalities but represents technology-enabled interactions of stakeholders[3]. The data platform as envisaged by RICHFIELDS will necessarily be a two or even more sided-platform in which the interactions between data providers and data users are key to the success the platform. From this perspective, it is essential to consider the Minimum Viable Ecosystem (MVE) in which the MVP can be sustained and developed. Data providers are a fundamental part of the MVE, as are data users. Therefore, a robust governance and management structure is also of vital importance to ensure that the process of data sharing between public and commercial organizations is well-governed by a transparent effective governance structure and therefore also forms a fundamental part of the MVE.

- The **growth stage** should be initiated once the MVP and MVE has been implemented and within which an extended set of data users, data providers and services are developed and offered 'as and when' they become feasible. The assumption being that once a successful MVP has been achieved more data providers and data users will be willing to engage with the platform thus increasing its value, capacity and impact.

- The **maturity stage,** this stage reflects the ultimate vision of a fully operational data platform aligning and sharing consumer, business and research data in order to provide the scientific research community with innovative data sets and the ability to generate new knowledge in the consumer food and health domain.

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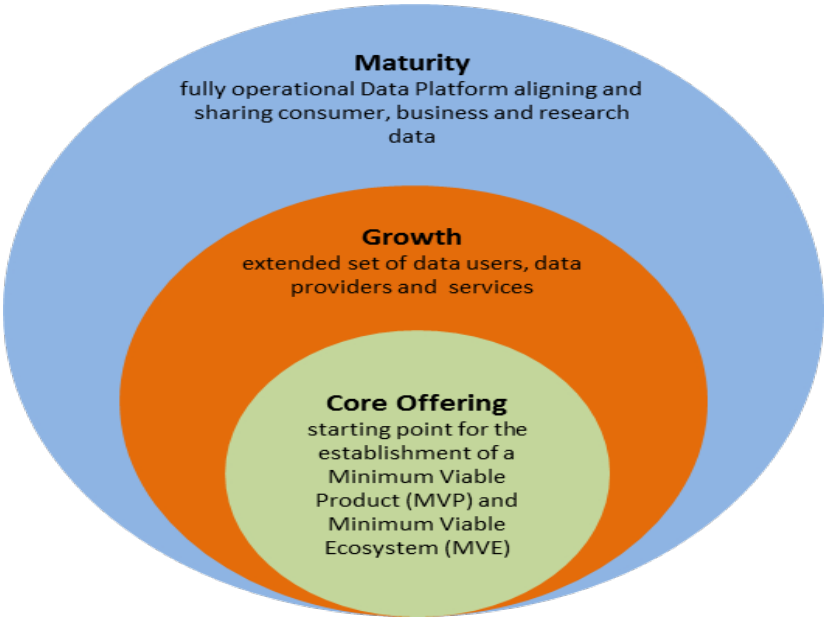

Figure 1 – Proposed phases of development for the Data Platform

Within each of the above stages there will be many critical choices to be made about the levels of offering that can feasibly be delivered and the possible pathways to delivering them, as well as the key data users, data providers and other stakeholders that are essential to achieve that level of offering. This staged approach allows for the tasks required/issues to be identified and de-lineated in a more targeted way thus providing greater clarity. Whilst the levels of offering will ultimately need to correspond to the ambitions of the project they will be somewhat mediated by what is feasible in terms of data access from a technical and/or ethical governance perspective within the time-frame of the project. However, all the possible levels of offering need to be considered, both short, medium and longer term but with the focus on a starting point of a '**Core Offering**' to facilitate the development of initial business and governance models, to establish a potential Minimum Viable Product (MVP) and Minimum Viable Ecosystem (MVE).

3.2 Users and other Stakeholders

In terms of definition, a 'User' is any person, organisation or IT system that uses the proposed data platform. A 'Stakeholder' is defined as being any person or an organisation with an interest or concern in the data platform. This includes those previously defined as users but also other parties that will not be direct users of the data platform but nevertheless have an interest in it (e.g. consumers, NGO's government and policy makers).

It is clear from the overall project objectives that the **primary users** will be academic researchers/scientists working in publicly funded, academic research organisations under conditions that do not raise questions of independence vis-a-vis business, politics or lobby groups. However, it is recognized that there is a fundamental need to engage users in the form of **data providers** from outside the public research domain, i.e. those from the commercial food chain organisations, and health/lifestyle app developers etc. to provide the necessary data for the proposed platform. RICHFIELDS will therefore need to consider the needs of users from both of these domains but it is

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unlikely that they will be allowed the same level of access to the data platform for ethical/legal reasons. As a result of this, there is a need to develop a meaningful value proposition for commercial data providers in the form of services, or access to new knowledge, that may help them enhance their own products if they are to engage.

Similarly, the needs of other stakeholders such as citizens/food consumers need to be fully considered to ensure the data platform is ethically able to access the in-situ data they generate via their use of mobile/wearable technologies either directly from them or via the app developer who collects their data. The data platform will therefore need to ensure it offers a value proposition for all users and stakeholders and it must be recognized that each will have very different motivations/barriers for engagement.

As a starting point for the development of the MVP, potential data users and data providers of the data platform for consideration by Phase 3 are detailed in Table 1. Ultimately some of these will form part of the MVP but others will be deferred for inclusion in the growth stage of development of the platform as defined by the outcomes of the Phase 3 activities.

Table 1: Potential Users of the Data Platform and other Stakeholders with an interest in the proposed Data Platform

Description	Data users	Data providers	Stakeholders
Primary users : Publicly Funded Individuals/Organisations			
Researchers/scientists and research organisations	√	√	√
Research Organisations and Infrastructures	√	√	√
Experimental facilities dealing with food-related lifestyle and consumer behaviour data generation and analysis	√	√	√
Policy makers/government (both at EU and country level)	√	√	√
Health professionals (Doctors, dieticians, etc.)	√	√	√
Other users: Private or Public/Private funded individuals and organisations			
Researchers/scientists and research organisations		√	√
Research Organisations and Infrastructures		√	√
Experimental facilities dealing with food-related lifestyle and consumer behaviour data generation and analysis		√	√
Food business (including agriculture, manufacturers and retailers)		√	√
Health professionals (Doctors, dieticians, etc)		√	√
App developers		√	√
NGOs		√	√
Other users: Consumers and communities			
Consumers		√	√
Consumer organisations and communities (e.g. weight control communities, allergy communities, sustainability communities etc)		√	√

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3.3 The Core Offering Proposal

The initial RICHFIELDS design for a 'Core Offering Proposal' was developed by adapting methodology successfully employed within a previous EU project[4]. For the purposes of the RICHFIELDS project this involved identifying and categorizing all the elements considered necessary to constitute a 'Core Offering' for the proposed **open architecture data platform**. This was achieved by identifying and capturing potential products/services of value to the potential users that were already being developed with the RICHFIELDS project current workplans. Other elements considered necessary to facilitate the data platform such as the development of an overarching internet site (access portal) for data providers and data users to access the platform, and to ensure fundamental activities associated with governance, ongoing user/stakeholder engagement and dissemination to support the data platform were also identified. All the elements were then logically organized and presented in a one-page visualization diagram representing an overview of what the resulting data platform might consist of.

This initial diagram was then discussed and fine-tuned based on feedback from Phases 1, 2 and 3 and the PMT and finally presented to the whole consortium, including the project advisory group members, at the plenary meeting in Gothenburg (7-8/March/17). The initial 'Core Offering Proposal' was refined based on the feedback obtained and the resultant proposal (Fig. 2) was then utilized to communicate the RICHFIELDS design project vision and invite feedback on motivations/barriers to engage with the proposed open architecture data platform from potential users and stakeholders at the 2nd Stakeholder Workshop held in Brussels (4/April/17).

The Core Offering (Fig. 2) proposes the core concepts to be considered for potential inclusion into the design of the data platform. By exploring these from the perspective of their applicability in terms of technological capabilities, governance and ethics and their potential to contribute to the value offering to users (Business Modelling), Phase 3 can identify which of these elements are fundamental and possible for the MVP and which elements can be deferred for implementation (Growth Stage) of the data platform.

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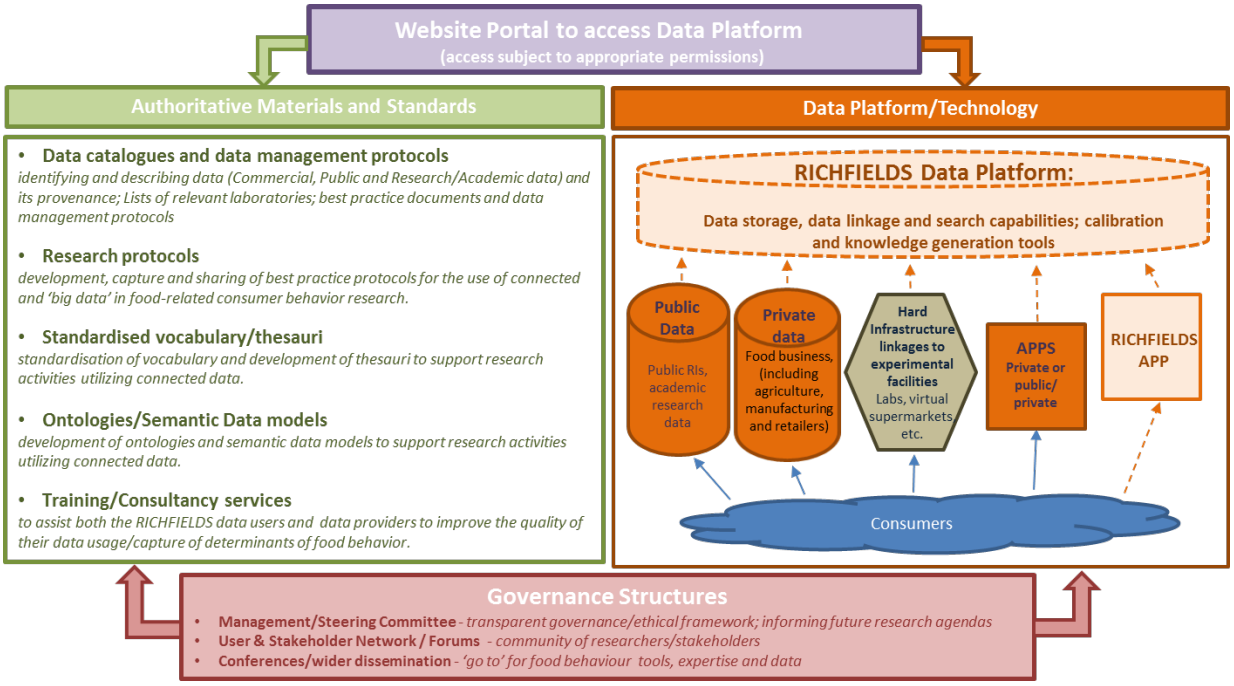

Figure 2 – Core offering proposal for the Data Platform

3.3.1 Internet Site (Portal)

Regardless of what the final data platform consists of in terms of data and services it will need to be hosted via an overarching website where users can access data and services. However, the value of investing in the development of an attractive and engaging website is far greater than for data access purposes alone. Consideration should also be given to the development of a public facing website in order to communicate the RICHFIELDS vision, purpose and achievements to the wider community. The importance of an outward facing website for an organisation to promote identity and to facilitate the building of relationships with key users and stakeholders is well established[5,6].

The website will serve not only to establish the core offering of the open architecture data platform as an expert resource and convey credibility but will help to support engagement and dissemination and thus potentially unlock additional data sources. It will also serve as a necessary hub for social media activities to develop impact and wider dissemination.

3.3.2 Authoritative Materials and Standards

The development of authoritative materials and standards is a fundamental requirement for the creation of the open architecture data platform however these can also be more widely exploited to stakeholders other than the primary data users as a means to establish best practice and to help shape the research community moving forwards.

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3.3.2.1 Data catalogues and data management protocols

Within the current RICHFIELDS project workplans a number of valuable elements e.g. documents, catalogues, databases) are being developed which identify and describe data pertinent to the proposed RI/Platform from a range of different domains (i.e. Public, Private, Public/Private and Citizens). It is important that these are captured as potential products/materials/service offerings for the users of the proposed data platform and the wider stakeholder community. Therefore Phase 3 should ensure that as many of these are captured and made available to users as part of the final specification of the platform.

These include:

- Data catalogues identifying and describing data (Commercial, Public and Research data) and its' provenance including the Research Inventory Management System 'RIMS' database cataloguing a range of consumer data APPs in the domains of purchase, preparation and consumption (Phase 1, WPs 5,6 & 7).
- Identification of experimental facilities in Europe collecting food behaviour data e.g. sensory labs, virtual supermarkets (Phase 2 WP10) to be used as a starting point for the development of hard infrastructure linkages between these types of expert facilities and the open architecture data platform being developed.
- Identification of approaches and best practice materials in existing RIs, and other relevant experimental facilities (Phase 2, W9)
- Data management protocols, including calibration/standardisation protocols for both data providers and data users.

3.3.2.2 Research protocols

The EU-funded CSA EuroDISH5 has identified the need for research infrastructures (RIs) in the food and health domain that can advance research within, among and over-arching the so-called '**DISH**' research domains: **D**eterminants of dietary behaviour, **I**ntake of foods and nutrients, **S**tatus and function of the body, and **H**ealth and disease risk. To advance food and health related consumer research, the scientific community needs the development of unique services for collecting, aligning and sharing innovative data types and to build the evidence-base that underpins and supports adequate responses to the societal challenge of "prevention of diet-related diseases". To this end, technologies to collect, align and share (real-time) data on food- related behaviour and lifestyle are urgently needed covering the whole range from purchase (e.g. in-store), preparation (e.g. in the kitchen) and consumption of foods (e.g. in the dining room). This will overcome the status quo where food-related consumer behaviour and lifestyle tends to be studied in isolation, in short time frames and in a relatively limited social and physical context.

From a sustainability perspective, it is fundamental that the open architecture data platform achieves status as the 'go-to' resource for best practice on research in this domain and supports data users in their efforts to generate new knowledge. It is recommended that at some point (possibly not in the MVP stage) the data platform includes the development, capture and sharing of best

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practice protocols for the use of connected and 'big data' in food and health related behaviour, lifestyle and well-being research.

3.3.2.3 Standardized vocabulary, thesauri, ontologies and data models

In order to connect and utilize data from different sources to stimulate high-quality research, a level of standardization is required. This includes standardization of vocabulary and development of thesauri to describe the data provenance and its quality, the development of ontologies and semantic data models for connecting data and the establishment of best practice protocols to support the research activities utilizing connected data. It is recommended that these should also be considered for inclusion as products/services in the final design and made available as authoritative and best practice materials to users of the proposed data platform.

3.3.2.4 Training/consultancy services

For future sustainability of the open architecture data platform and to enhance its future potential to support high quality research it is important that RICHFIELDS project seeks to assist both the data users of the platform and data providers (e.g. business/APP developers) to improve the quality of their data usage/capture of determinants of food behaviour. To facilitate this, it is recommended that the Core Offering should consider including training services either via online or physical courses and possibly even consultancy on a one-to-one basis. This type of service offering, sharing expertise and best practice, will not only raise the quality of data being collected from consumers and by industry for the future, but also enhance capabilities to perform high quality research within this domain. It is important therefore to include well respected research centres, experimental facilities and laboratories into the ecosystem early on so that the technical capability and capacity to offer these types of services is built in from the outset.

3.3.3 Data Platform and Tool development

The vision of the RICHFIELDS project is to design a world class open architecture data platform to collect, align and share consumer, business and research data in order to provide the scientific research community with innovative data sets and the ability to generate new knowledge in the consumer food and health domain. Furthermore, the new knowledge generated as a result of the proposed core offering data platform will enable policymakers and other stakeholders to develop, evaluate and implement effective food and health strategies at the level of both individuals and populations. This open architecture data platform should enable a scientifically reproducible, technically sound and socio-legally robust evidence-base, which enables publicly funded researchers to efficiently collect, align, and share research data on food purchase, preparation and consumption of EU-citizens in their everyday life.

- ***Data platform:*** *The extent to which data from different sources can be connected via the platform will depend on whether the data owners can be persuaded to engage and give their consent and the technical capabilities of linking their data. The extent to which access to the data can be shared will depend on the ethical requirements of the data providers/owners which must be managed by an effective governance model. Each individual set of data will*

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need to be fully explored both in terms of technical capabilities and ethical requirements before inclusion into the data platform.

- ***Tool development**: The extent to which data can be linked across the proposed data platform will depend on the level of standardization/calibration that can be provided in the form of tools and services. There is therefore a need to consider the development of calibration/ standardization tools in the core offering for the data platform. In addition, search and knowledge generation tools will be required to make use of the effective use of the data platform. Bearing in mind the potential difficulties (privacy, ethical/legal issues and quality in terms of data collection methodology) associated with app generated consumer data, it may also be worth considering inclusion of a bespoke app into the technological solution which could be used to potentially supplement the available data from other RIs and the food industry with high quality in-situ generated consumer behaviour data. Whilst not a perfect solution, in the shorter term, the development of a cohort of citizen data providers via this bespoke app may serve to overcome many of the hurdles identified in accessing and utilizing the existing commercial app generated data.*

The outcomes of the Phase 1 have highlighted that there is lack of publicly accessible data from the vast majority of the commercial apps they investigated and insufficient information regarding the terms of use and privacy policies associated with the data collected (c.f. D5.5, 6.5 and 7.5). However, in contrast, the outcomes of Phase 2 are more positive in the sense that accessing data from other research infrastructures and even data from food retailers and laboratories may be more achievable. It is suggested therefore that when developing the MVP focus is given initially to establishing the added value for the primary customer group (i.e. the publicly funded research community) for having access to this potentially more readily available data and developing an understanding of the types of research questions that could be answered with it.

In particular developing harder infrastructure links with existing experimental facilities should be explored for the core offering for example interface with research-generated data from experimental facilities such as:

- *Virtual supermarkets to study food purchase behaviours*[7]
- *Virtual kitchen of the future to study in home or restaurant-based food preparation, e.g. as developed by Philips*[8] *and Electrolux*[9]*. Fake Food Buffets to study environmental influences on consumers' choices*[10]*.*
- *Restaurant of the Future or virtual buffet to study food purchase in 'out of home' contexts*[11]*,* [12]*.*

3.3.4 Governance

Undoubtedly, the success of the resultant open architecture data platform largely depends on the governance structures implemented. It is of vital importance that the process of data sharing between public and commercial organizations is well-governed by a transparent effective governance structure[13]. Whilst it has been demonstrated that there is a willingness to share data for public good[14], this willingness is dependent on transparency and trust. Without this, it is unlikely that stakeholders would agree to share their data and there is a risk that appropriate ethical and legal

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gate-keeping may not be implemented. Thus, the Governance structure defined by the RICHFIELDS project needs to include a robust management committee and decision-making structure with effective mechanisms for control for the day to day management of ethical aspects, including data ownership and privacy.

In addition to an effective governance structure, other management and dissemination activities should also be considered for inclusion into the core offering design to help to ensure the future sustainability of the proposed data platform and these are discussed below.

3.3.4.1 Management/Steering Committee

In conjunction with effective governance structures, it is recommended that management activities are established in the core offering including a 'Steering Committee' that is tasked with continually growing the value offering, anticipating and reacting to new societal challenges within the food-related consumer behaviour domain and seeking to grow the offering in terms of data connection capabilities and scientific advancement. This is fundamental to ensuring the ongoing sustainability of the data platform.

3.3.4.2 User Forums/Stakeholder Networks

The value of regularly engaging with and inviting feedback from users/stakeholders is an established way of ensuring a products or services continue to satisfy ever-changing needs. It also helps to ensure continued engagement from data providers, data users and other stakeholders who are more likely to feel valued if they have a voice within the organization. Therefore, it is recommended that this is included in the core offering as feature for consideration.

3.3.4.3 Conferences/Wider dissemination activities

As mentioned in previous sections, from a sustainability perspective it is fundamental that the open architecture data platform achieves status as the 'go-to' resource for food-related consumer behaviour data and one way to achieve this would be to establish an annual conference to disseminate the benefits of utilizing the data platform in research activities. By communicating successful outcomes of research utilizing this data to the wider research community, the impact and credibility of the data platform will be substantially increased.

4. Conclusions and implications

The Core Offering Proposal (Platform design – Initial concepts) seeks to support decision making within Phase 3 and to facilitate the development of the future open architecture data platform design specification. Within each of the Phase 3 workpackages, the elements proposed within the Core Offering can be explored in an integrated way (Fig. 3) from the perspective of technical capabilities (WP11), their value from a Business Model perspective (WP12) and ultimately their feasibility from an ethical/governance perspective (WP13). It may be necessary to move certain elements from the Core Offering Proposal into the Growth phase of the design specification based on the outcome of these activities. Consideration should also be given to the development of a focused MVP/MVE specification within the fuller specification being designed in Phase 3 in order

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to be able to communicate to future funders the reality of a potentially market-ready product that could add value to the domain. This could then ease the way for obtaining future funding for the implementation of the data platform.

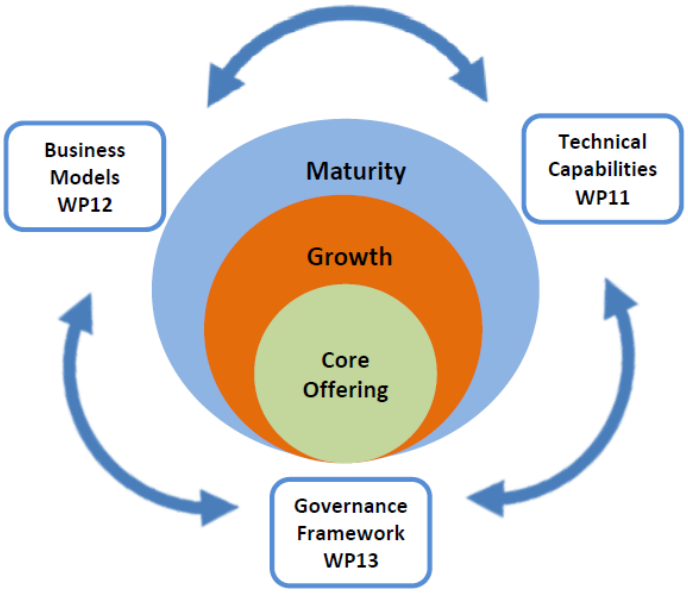

Figure 3 – Refining the Core Offering Proposal (Phase 3)

In order to develop the Core Offering Proposal into a detailed specification it is proposed that initial consideration by Phase 3 is given to answering the following 4 questions as a priority:

1. What data/metadata can be readily incorporated into the data platform at the MVP level from an availability/ethical perspective?
2. Are these data of sufficient value to the proposed primary users; If not how will the additional data required be obtained?
3. Is there a sufficient value offering for data providers to ensure access to the data required?
4. Which stakeholders are essential to form the MVP/MVE ensuring appropriate levels of Governance and User engagement?

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Appendix

Appendix 1 – RICHFIELDS Glossary

This appendix has been attached to facilitate the reading of this deliverable. This Glossary is however a living document and will be continually updated by Phase 3 throughout the life of the project, to capture and define new terms.

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RICHFIELDS
Glossary – working document
Version October 12th 2017

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Status:

- The first version (3 Sep 2017) has been created by Krijn based on the document in Excel by Barbara of July 19, a mail from Indira on the GDPR terms, and a discussion with Lada and Charo discussing review comments from Pieter on a WP4 deliverable. It is focussed on the problems with the different use of the word 'User'.
- Deliverables and discussions are asked to use the preferred terms in this document. Suggestions for improvement and additions are welcome. Deviation from preferred terms is possible, if justified and clearly indicated and explained.
- This version (12 Oct 2017) includes comments and additions provided by Charo, Javier, Indira, Golboo, Bent.
- When a definition is copied from another (legal) text, we must include the source of the definition.
- This glossary is descriptive and not normative.

Glossary – General introduction

To improve readability and understand relations between terms, the Glossary has been organised by a number of topics:

- Data - related terms
- Stakeholder, users, clients, data providers
- GDPR/legal terms
- ICT – terms
- Xxxx

For the same reason, terms are not always in alphabetical order.

Terms have been defined, and comments added, with an eye to what we need for the core-offer. Definitions may later be detailed in Phase 3 if needed, or in developments after the Core Offer / MVP.

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Section 1 – Data management terms		
Term	**General Definition**	**Comments**
Openness	Openness in relation to data and content means anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness).	
Big data	Big data refers to a massive volume of structured, semi-structured and unstructured data that is so large and moves so quickly it is difficult to process using traditional database and software techniques.	
Data	Data are facts from a particular entity that can be quantified, measured, organized, and stored. Data can be quantitative or qualitative. Data are basic elements of "truth," without interpretation or greater context (adapted from Zins, 2007). Data could be text, numbers, graphics. Amended from:http://www.success.co.il/is/zins_definitions_dik.pdf	
Data harmonisation	Data harmonization facilitates the combination of data from heterogeneous sources into integrated, consistent and unambiguous information. Amended from: http://www.theseusproject.eu/wiki/Data_harmonization Data harmonization refers to the improvement of data quality and utilization through the use of natural language processing and machine learning capabilities.	
Data provenance	Data provenance (also referred to as data lineage) is the ability to record the derivation history of data, its place of origin and primary ownership	
Data usage	Data usage (also referred to as data provision) is a process of providing users (that include humans as well as information systems, such as the RICHFIELDS platform) with access to data.	
Information	The word 'information' is related to the Latin verb 'informare', which means "to inform". When data is brought into context, and	

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	processed into a form that is meaningful to the recipient (Davis & Olson, 1985) it is information.	
Knowledge	Knowledge is the awareness of data brought into relation to form information in a wider sense. Knowledge acquisition involves complex cognitive processes, such as perception, communication and reasoning. Knowledge is structured and organized information that has been developed within a cognitive system or is part of the cognitive heritage of an individual (based on C. S. Peirce; Burks, 1958; Hartshorne & Weiss, 1931).	Should 'knowledge acquisition' be included as a separate term? Does it refer to knowledge acquisition by natural persons or does it include AI systems?
Knowledge extraction (machine based)	Knowledge extraction is the creation of knowledge from data. The resulting knowledge needs to be in a machine-readable and machine-interpretable format and must represent knowledge in a manner that facilitates inferencing.	
Linked data	Linked data is a term used to describe a recommended best practice for exposing, sharing, and connecting pieces of data, information, and knowledge on the Semantic Web.	
Metadata	Metadata is data that provides information about other data.	
Platform	Platform is any hardware or software used to host an application or service.	Note that Platform is an ICT term. You might use RI Research Infrastructure in other cases or in general.
Requirements specification	Requirements specification documents the requirements for a system or service to be implemented.	
Semantic Web	Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries.	
Semi-structured data	Semi-structured data is a form of structured data that does not conform with the formal structure of data models associated with relational databases or other forms of data tables, but nonetheless contains tags or other markers to separate semantic elements and enforce hierarchies of records and fields within the data.	

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Structured data	Structured data has a tightly organized structure (i.e., well defined type, fields to be stored, and any restrictions on the data input).	
Unstructured data	Unstructured data usually refers to data that may have an internal structure but doesn't fit in a traditional row-column database (e.g., text and multimedia content). Examples include e-mail messages, word processing documents, videos, photos, audio files, presentations, webpages and many other kinds of business documents.	

Glossary – Stakeholders, users, data providers, customers etc.

Section 2 – Richfields specific terms		
Term	**Description**	**Comments**
Richfields RI	A world class Research Infrastructure (RI) that will serve as a platform to collect, align and share consumer, business and research data in order to provide the scientific research community with innovative data sets and the ability to generate new knowledge in the consumer food and health domain.	
Richfields Platform	RICHFIELDS RI will host a linked **data platform** that will provide an opportunity to address the determinants of consumer behaviour relevant to food and health across three distinct instances of behaviour that are relevant components of food consumption: **purchase, preparation and consumption**.	
Richfields Core Offering	A conceptual framework complemented by a three- stage development process approach; 'Core', 'Growth' and 'Maturity'. It outlines the elements that the RI/Platform could potentially include in terms of data and services and will facilitate the necessary focused decision making within	

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	the Phase 3 workplans to achieve the overall project objectives for a sustainable structure, governance and business model.	
Richfields Minimum Viable Product (MVP)	The minimum set of data, tools and services required to satisfy the primary user group.	
Richfields Minimum Viable Ecosystem (MVE)	The RI/platform as envisaged by RICHFIELDS is necessarily a two or even more sided-platform in which the interactions are key to the success the platform. From this perspective, it is essential for the RI to consider the Minimum Viable Ecosystem (MVE) in which the MVP can be sustained and developed. Data providers are a fundamental part of the MVE as are date users. A robust Governance and management structure is also of vital importance to ensure that the process of data sharing between public and commercial organizations is well-governed by a transparent effective governance structure and therefore also forms a fundamental part of the MVE.	
Richfields Stakeholder	Stakeholder is any person or organisation with an interest or concern in the RICHFIELDS platform, or being affected by the RICHFIELDS platform.	This includes organisations that are concerned about the Richfields platform (e.g. NGO who worry about privacy or commercial data organisation that feels threatened); some will check the RF website, others not even that.
Richfields User	User is a person or an information system that uses the RICHFIELDS RI / platform.	**This is a very unclear term that should be avoided**. If used, it is every person (natural or legal), organisation or IT system that uses the Richfields (IT) platform; in that case use the term Platform- or System-User. This includes the RF Management and ICT staff, and e.g. bots from search engines like Google that index the world wide web.

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		Use Clients, Customers, Scientists/Researchers if you want to indicate those who use the RF data in research after data storage or treatment in the RI. Below we discuss the three groups of system-users: RF staff, RF data providers and RF clients. Note that in different business models the composition of these groups can be different (e.g. citizens as client yes or not). Note also that these are often roles: a person can be a scientist from 9 to 5 and a private data-providing citizen in the evening. Which means that in theory a natural persons with a certain passport number (as unique identifier) can be twice in the system.
Richfield staff	Persons or organisations that according to the governance structure of the RF RI are active in the management or operational activities of the RF platform	WP 11 distinguishes in this category ICT and non-ICT staff, linked to the authorisations in the IT system. Staff includes management
Richfields Data provider	Any organisation or person that provides data to the RF platform	This category can be split into at least 4 groups. At a later stage it might be useful to split into even more. For the moment we distinguish: citizens (food consumers) that provide data, app-developers, commercial food chain organisations and researcher/research labs. These groups often provide data not (only) on themselves, but on other Data subjects (a legal term). If they do so, they are, like RF platform, itself a Data processor (another legal term).
Commercial food chain organisation	Any organisation active in the food chain that provides data to the RF platform (in certain business models they can also be client)	We take the term broadly, so not only retail, but also organisations like GS1, Nielsen panel, Telecom-companies, weather data services and even public organisations like hospitals or public authorities with (open) data that are relevant. However app-/ict companies are a separate category, so the term commercial organisation is broader.

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App-developer / App(data) - provider	Any organisation, commercial or not, that develops or runs an app that collects data on individual citizens that could be of interest to RF.	Includes apps from universities or patient organisations. App is used as short for ict-application in the broadest sense: not only smart phone apps but also wearables, kitchen tools with internet of things etc. The idea to have a service to test the quality of apps and give recommendations to the public, is not part of the core offering.
Richfields Customer	Any organisation or person that uses the authoritative materials and standards (including data) from the Richfields Platform	These are the persons (organisations) that use the services of the RF RI in documenting, cleaning and upgrading the data. It includes persons who just do one training course or download an (open) ontology from the RF website, but most of them will ask for access to individual data. It depends on the business model who is a client. In general this will be researchers (scientists), either in public or commercial organisations. In one of the business models of WP12 also the Citizens (food consumers) are clients, as they get personal advise on food intake, based on the algorithms of the RF platform. Also policy makers can (probably, according one of the scenarios for the business model) be (indirect) clients.
Researcher / Scientist	Any person that tries to create knowledge by performing research with the authoritative materials and standards (including data) from the Richfields Platform	Researchers can work in very different organisations (including retired or independent in their own company). Two broad categories are public in academia and commercial. Researchers try to create knowledge, but that can be on very different topics and for different purposes. And with different methods: • (fundamental research) into consumer behaviour or the relation between food and health. • Research for institutes for public health and food safety

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		• Product development, e.g. in a food company (imagine Unilever that wants to create a product for heart patients or kick boxers that need extra iron) • Policy research (imagine a research institute or a researcher in a ministry interested in the impact of a tax on sugary drinks or meat) On methods, a special category of researchers is the data scientist (see below) So in many cases using the term Researcher or Scientist is fine as no precision is needed or from the context it might be clear that you think of a person doing fundamental research in a public university paid by a government grant. But in many cases you might be more precise.
Academic (or Public) researcher/scientist	Researcher working in a public, academic research organisation under conditions that do not raise questions of independence vis a vis business, politics or lobby groups.	In the core offering we can live with this. WP13 might be tempted to think about this in more detail, or this can be done after the core offering. There is a very grey area of professors on a chair paid by industry, public-private contracts, research institutes not linked to universities, , etc.
Scientist or researcher in food business	Researcher working in a research organisation with a commercial environment.	Could for the moment include NGOs, ministries (policy research), etc. Objectives could be product development or marketing, so specify if needed.
Policy maker	Person working in a governmental organisation (EU, (regional) ministry) that is active in managing agricultural, food and health policy.	What of national? Or semi-governmental organisations? Quangos?
Data scientist	Data scientist is a big data professional required to:	Should we state IT professional in general terms?
	· Extract huge volumes of data from multiple internal and external sources;	
	· Employ sophisticated analytics programs, machine learning and statistical methods to prepare data for use in predictive and prescriptive modeling;	

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	· Thoroughly clean and prune data to discard irrelevant information;	
	· Explore and examine data from a variety of angles to determine hidden weaknesses, trends and/or opportunities;	
	· Devise data-driven solutions to the most pressing challenges;	
	· Invent new algorithms to solve problems and build new tools to automate work;	
	· Communicate predictions and findings to management and IT departments through effective data visualizations and reports;	
	· Recommend cost-effective changes to existing procedures and strategies.	
Lab	Any research infrastructure that is of interest to RF as it can deliver data or provide services for research through the RF platform.	Specialised research organisation or a specific part of a research organisation. Narrow down to behavioural labs.
Research organisation	Any organisation that houses researchers or labs that are relevant for the RF RI. Research organisation means an entity, such as university or research institute, irrespective of its legal status (organised under public or private law) or way of financing, whose primary goal is to conduct fundamental research, industrial research or experimental development and to disseminate their results by way of teaching, publication or technology transfer; all profits are reinvested in these activities, the dissemination of their results or teaching; undertakings that can exert influence upon such an entity, in the quality of, for example, shareholders or members,	Can be commercial or academic / public. See researcher. Could be a client to involve a number of its researchers.

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	shall enjoy no preferential access to the research capacities of such an entity or to the research results generated by it.	
Fundamental research	Fundamental research means experimental or theoretical work under taken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any direct practical application or use in view	
Industrial research	Industrial research means the planned research or critical investigation aimed at the acquisition of new knowledge and skills for developing new products, processes or services or for bringing about a significant improvement in existing products, processes or services. It comprises the creation of components of complex systems, which is necessary for the industrial research, notably for generic technology validation, to the exclusion of prototypes	
Experimental developments	Experimental development means the acquiring, combining, shaping and using of existing scientific, technological, business and other relevant knowledge and skills for the purpose of producing plans and arrangements or designs for new, altered or improved products, processes or services. These may also include, for example, other activities aiming at the conceptual definition, planning and documentation of new products, processes and services. The activities may comprise producing drafts, drawings, plans and other documentation, provided that they are not intended for commercial use.	
Business organisation	Business organization, an entity formed for the purpose of carrying on commercial enterprise. Such an organization is predicated on systems of law governing contract and exchange, property rights, and incorporation.	
Public body	a public sector body or a legal entity governed by private law with a public service mission providing adequate financial guarantees.	

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Private sector	The private sector encompasses all for-profit businesses that are not owned or operated by the government. Companies and corporations that are government run are part of what is known as the public sector.	
Public private partnership	it refers to forms of co-operation between public authorities and the private sector which aim at ensuring the funding, construction, renovation, management and maintenance of infrastructure associated with the provision of a service.	
Non-profit entity	A legal entity which by its legal form is non-profit-making or which has a legal or statutory obligation not to distribute profits to its shareholders or individual members.	
Civil society organisation	A civil society organisation is an organisational structure whose members serve the general interest through a democratic process, and which plays the role of mediator between public authorities and citizens. Examples of such organisations include: social partners (trades unions & employers' groups); non-governmental organisations (e.g. for environmental & consumer protection); grassroots organisations (e.g. youth & family groupings).	
NGO	Non-governmental organisation is any non-profit, voluntary citizens' group which is organized on a local, national or international level. Task-oriented and driven by people with a common interest, NGOs perform a variety of service and humanitarian functions, bring citizen concerns to Governments, advocate and monitor policies and encourage political participation through provision of information. Make a distinction between PINGO (public interest) and BINGO (business interest).	Realize that this is not per definition for the public good (whatever that is), but often stresses a certain aspect of it. It can be consumer organisations, patient organisations, environmental and animal welfare organisations (fair trade, meat and animals), industry organisations, (policy) foundations, etc. Some organisations are not only lobbyists buts also do-ers (e.g. the Red Cross) that manage apps or fund research.

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Glossary – Legal

Section 3 – GDPR / Legal definitions		
Term	**Description**	**Comments**
Richfields Citizen (food-consumer)	Any private person that provides (donates) data to the RF platform by direct delivery or by giving consent to app developers or commercial food chain organisations to make their data / data on themselves available.	We often use the word Consumer, as in food consumer. Is OK but sometimes difficult to differentiate from a RF Costumer. Citizen is in line with the Citizen Science idea. In general the provided data is on the citizen her/his self, but include data on children or others of the household.
Data subject	an identified or identifiable natural person	an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person; (derived from article 4 GDPR)
personal data	means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person;	Much of what RICHFIELDS will be dealing with, in my view (Indira), is likely to be seen as personal data even if there is a de-identification process The principles of data protection should apply to any information concerning an identified or identifiable natural person. Personal data which have undergone pseudonymisation, which could be attributed to a natural person by the use of additional information should be

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		considered to be information on an identifiable natural person. To determine whether a natural person is identifiable, account should be taken of all the means reasonably likely to be used, such as singling out, either by the controller or by another person to identify the natural person directly or indirectly. To ascertain whether means are reasonably likely to be used to identify the natural person, account should be taken of all objective factors, such as the costs of and the amount of time required for identification, taking into consideration the available technology at the time of the processing and technological developments. The principles of data protection should therefore not apply to anonymous information, namely information which does not relate to an identified or identifiable natural person or to personal data rendered anonymous in such a manner that the data subject is not or no longer identifiable. This Regulation does not therefore concern the processing of such anonymous information, including for statistical or research purposes. Recital 38 states: Children merit specific protection with regard to their personal data, as they may be less aware of the risks, consequences and safeguards concerned and their rights in relation to the processing of personal data.

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		Such specific protection should, in particular, apply to the use of personal data of children for the purposes of marketing or creating personality or user profiles and the collection of personal data with regard to children when using services offered directly to a child. The consent of the holder of parental responsibility should not be necessary in the context of preventive or counselling services offered directly to a child.
processing	means any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction;	This includes all research RICHFIELDS RI is a Processor
restriction of processing'	means the marking of stored personal data with the aim of limiting their processing in the future;	
'pseudonymisation'	means the processing of personal data in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person;	
filing system'	means any structured set of personal data which are accessible according to specific criteria, whether centralised, decentralised or dispersed on a functional or geographical basis;	
processor	means a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller;	RICHFIELDS RI is a processor. 'Controller' means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the

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		purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law; RICHFIELDS is a controller.
recipient	means a natural or legal person, public authority, agency or another body, to which the personal data are disclosed, whether a third party or not. However, public authorities which may receive personal data in the framework of a particular inquiry in accordance with Union or Member State law shall not be regarded as recipients; the processing of those data by those public authorities shall be in compliance with the applicable data protection rules according to the purposes of the processing;	Clients / Customers of RF will often be recipients
third party	means a natural or legal person, public authority, agency or body other than the data subject, controller, processor and persons who, under the direct authority of the controller or processor, are authorised to process personal data;	
consent	of the data subject means any freely given, specific, informed and unambiguous indication of the data subject's wishes by which he or she, by a statement or by a clear affirmative action, signifies agreement to the processing of personal data relating to him or her;	The research requirements for consent is that it is “informed” which includes assurances that the information provided is understood. Also highlight withdrawal of consent. And the factors for consent.
personal data breach	means a breach of security leading to the accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to, personal data transmitted, stored or otherwise processed;	
genetic data	means personal data relating to the inherited or acquired genetic characteristics of a natural person which give unique information about the physiology or the health of that natural person and which	

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	result, in particular, from an analysis of a biological sample from the natural person in question;	
biometric data’	means personal data resulting from specific technical processing relating to the physical, physio¬ logical or behavioural characteristics of a natural person, which allow or confirm the unique identification of that natural person, such as facial images or dactyloscopic data;	
‘data concerning health’	means personal data related to the physical or mental health of a natural person, including the provision of health care services, which reveal information about his or her health status;	
main establishment	as regards a controller with establishments in more than one Member State, the place of its central administration in the Union, unless the decisions on the purposes and means of the processing of personal data are taken in another establishment of the controller in the Union and the latter establishment has the power to have such decisions implemented, in which case the establishment having taken such decisions is to be considered to be the main establishment; (b) as regards a processor with establishments in more than one Member State, the place of its central administration in the Union, or, if the processor has no central administration in the Union, the establishment of the processor in the Union where the main processing activities in the context of the activities of an establishment of the processor take place to the extent that the processor is subject to specific obligations under this Regulation;	
representative	means a natural or legal person established in the Union who, designated by the controller or processor in writing pursuant to Article 27, represents the controller or processor with regard to their respective obligations under this Regulation;	
enterprise	means a natural or legal person engaged in an economic activity, irrespective of its legal form, including partnerships or associations regularly engaged in an economic activity;	

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group of undertakings'	means a controlling undertaking and its controlled undertakings;	
binding corporate rules	means personal data protection policies which are adhered to by a controller or processor established on the territory of a Member State for transfers or a set of transfers of personal data to a controller or processor in one or more third countries within a group of undertakings, or group of enterprises engaged in a joint economic activity;	
supervisory authority	means an independent public authority which is established by a Member State pursuant to Article 51;	
'supervisory authority concerned'	means a supervisory authority which is concerned by the processing of personal data because: (a) the controller or processor is established on the territory of the Member State of that supervisory authority; (b) data subjects residing in the Member State of that supervisory authority are substantially affected or likely to be substantially affected by the processing; or (c) a complaint has been lodged with that supervisory authority;	
cross-border processing'	means either: (a) processing of personal data which takes place in the context of the activities of establishments in more than one Member State of a controller or processor in the Union where the controller or processor is established in more than one Member State; or (b) processing of personal data which takes place in the context of the activities of a single establishment of a controller or processor in the Union but which substantially affects or is likely to substantially affect data subjects in more than one Member State.	
'relevant and reasoned objection'	means an objection to a draft decision as to whether there is an infringement of this Regulation, or whether envisaged action in relation to the controller or processor complies with this Regulation, which clearly demonstrates the significance of the risks posed by the draft decision as regards the fundamental rights and freedoms of data	

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	subjects and, where applicable, the free flow of personal data within the Union;	
information society service’	means a service as defined in point (b) of Article 1(1) of Directive (EU) 2015/1535.	
international organisation’	means an organisation and its subordinate bodies governed by public international law, or any other body which is set up by, or on the basis of, an agreement between two or more countries.	

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