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DIGITAL LIFELONG PREVENTION

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Spoke 2 Deliverable

SP2.D2.1 Concept of digital advanced functions and definition of protocols

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SP2.D2.1 Concept of digital advanced functions and definition of protocols

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1. Publishable Summary

The Spoke 2 (SP) in the D.A.R.E. Project advances primary prevention initiatives through pioneering digital innovations and meticulous protocol formulations. The efforts are directed towards pioneering an advanced interoperable surveillance system, an epitome of innovation integrating administrative, clinical, health, and environmental data sources. As the primary aim is to develop a robust digital infrastructure capable of not only aggregating different data streams at both individual and population levels, but also leveraging these insights to formulate targeted interventions and risk assessments, we herein describe the strategic design of digital functions, protocols, and Application Programming Interface (API) models, central to establishing an interoperable layer among the different pilot projects in WP2. At its core, this endeavor integrates different data source models and logical data architectures, ensuring a unified and secure internal data structure. Leveraging established technologies, this layer facilitates seamless data consolidation while upholding crucial aspects like isolation, modularity, and stringent access control.

The user-centric nature of the pilot proposals advocates decentralized or federated digital function models, fostering adaptability and tailored functionalities. This approach ensures agility, autonomy, and context-specific operations across diverse initiatives. Adopting an Agile methodology, particularly employing the Kanban approach for protocols, will reflect the commitment to dynamic and iterative processes. This methodology ensures streamlined operations, responsiveness, and continual improvements, aligning seamlessly with evolving initiative needs.

The pivotal role of the API model in translating functions and protocols into practical endpoints underscores our dedication to user accessibility and service-oriented design. These endpoints democratize access while ensuring ease and efficiency in interacting with our advanced digital infrastructure.

In conclusion, this collective effort signifies a significant stride in redefining healthcare strategies. By pioneering digital solutions, fortified by meticulous protocols and agile methodologies, we are poised to usher in a transformative era marked by adaptability, responsiveness, and impactful healthcare strategies.

2. List of abbreviations

DARE – Digital Lifelong Prevention

WP – Working Package

ML – Machine Learning

AWARE – Assess, Warn & Response

EMUR – Emergenza Urgenza

SDO – Scheda dimissione ospedaliera

UNIPA – Università degli Studi di Palermo

AOUP – Azienda Ospedaliera Universitaria Policlinico

FPG – Fondazione Policlinico Gemelli

UCSC – Università Cattolica del Sacro Cuore

LIMS - Heavy Metals and Nanoparticles

ARPA – Agenzia Regionale per la Protezione Ambientale

ETL – Extract/transform/Load

AQ – Air Quality

API – Application Programming Interface

URL - Uniform Resource Locator

SDK - Software Development Kits

3. Introduction

The advancement of the DARE project into Spoke 2 (SP2) marks a pivotal stage in our pursuit of pioneering primary prevention initiatives. At the heart of this phase lies an ambitious goal centered on digital innovation and the meticulous formulation of protocols to revolutionize our approach in tackling multifaceted societal health challenges.

SP 2 signifies a concerted effort directed towards pioneering an advanced interoperable surveillance system, an epitome of innovation integrating administrative, clinical, health, and environmental data sources. The primary aim is to develop a robust digital infrastructure capable of not only aggregating different data streams at both individual and population levels, but also leveraging these insights to formulate targeted interventions and risk assessments.

Under the SP 2, our primary objective revolves around the orchestration and execution at the baseline of eight pilot projects for WP2. Each of these initiatives has been meticulously crafted to exploit the potential of digital technologies while delineating precise protocols to guide their implementation. These pilots collectively represent different strategies aimed at fortifying the primary prevention landscape dealing with a health and environment community-based interoperable digital approach. Most of the developing digital function will support a prototype of Digital Prevention Research Center, designed to be polycentric and spread over the target communities, allowing interoperability of the data among different bodies and institutions (local health agencies, hospitals, environment protection agencies, health professionals, citizens' associations, market operators, etc.).

Therefore, by defining robust protocols, we aim to not only streamline operational procedures but also promote an environment conducive to innovation, adaptability, and scalability. Through these efforts, we aspire to pave the way for a paradigm shift in preventive interventions, transcending conventional boundaries.

This report serves as a comprehensive overview of the foundational concepts and methodological frameworks underpinning the digital advanced functions and protocols governing our eight pilot initiatives.

The synthesis of cutting-edge technology with well-defined protocols stands as a testament to our commitment to catalyze change and pioneer novel approaches in primary prevention.

3.1. Objectives of the deliverable

The cornerstone of SP 2 within the DARE Project is to cultivate an advanced interoperable surveillance system powered by an innovative digital infrastructure. This system is meticulously designed to integrate administrative, clinical, health, and environmental data sources, facilitating comprehensive risk assessments and targeted interventions.

In this context the objectives of this Deliverable comprehend:

- the development of sophisticated surveillance tools for risk assessment and targeted interventions based on health, environmental and genomic determinants;
- the integration of cutting-edge digital technologies to fortify primary prevention initiatives across diverse life stages and occupational settings;
- Implementation of pioneering community-based digital primary preventive interventions, marking a paradigm shift in healthcare strategies.

Therefore, this deliverable encapsulates the foundational concepts, the methodological frameworks, and the operational architecture governing our pioneering piloting initiatives under WP2. Through this, we strive to elevate primary prevention strategies, transcending conventional boundaries and paving the way for transformative healthcare practices.

3.2.WP2 Operational Architecture (Tasks)

Hereafters are briefly described the activities of the 3 tasks included in the WP2.

The primary aim of **Task 2.1 (Advanced Cancer Surveillance System)** is to establish an advanced cancer surveillance system leveraging state-of-the-art digital infrastructure deployed in WP1. This system will utilize data-driven models and cutting-edge machine learning (ML) techniques to enhance cancer primary prevention through:

a) Integration of Diverse Data Sources: Integrating epidemiological data with information from environmental monitoring, occupational settings, health determinants, and lifestyle profiling to fortify cancer prevention strategies.

b) Interoperability of Registries and Biobanks: Creating an interoperable ecosystem by amalgamating population-based registries, specialized clinical registries, and biobanks. This fusion enables high-resolution studies and in-depth analyses.

c) Development of Advanced Models: Designing and implementing sophisticated models to evaluate the effectiveness of preventive interventions. These models will serve as valuable tools for assessing and refining preventive strategies.

Task 2.2 (Interoperable Health and Digital Environmental Data for Primary Prevention) focuses on establishing a web-based interoperable platform to synergize health data, environmental data, and individual information. This platform will enable:

a) Study of Environmental Effects on Health Outcomes: Leveraging data mining solutions to scrutinize the impact of environmental exposures across various life stages (newborns, children, pregnant women, adults, elderly) on health outcomes in distinct target populations.

b) Adoption of an AWARE Approach: Implementing an 'Assess, Warn & Response' (AWARE) strategy in collaboration with multiple institutions. This aims to shield public health and the environment from the detrimental impact of high-intensity pollution.

c) Preparedness Against Infectious Diseases: Establishing preparedness measures against infectious diseases and incorporating surveillance mechanisms to monitor antibiotic resistance, thereby bolstering primary prevention efforts.

Task 2.3 (Metals and New Materials from the Green and Digital Era: Risk Assessment and Prevention Strategies) employs an integrated multidisciplinary approach to address risk assessment and prevention strategies related to emerging pollutants and new-tech tools/products:

a) Risk Estimation of Exposure: Evaluating individual and cumulative risks associated with exposure to emerging pollutants from environmental contamination and trophic chain transfer.

b) Safer Management of New-Tech Tools: Developing strategies for the safer and healthier management of tools and components from the green and digital era, ensuring their end-of-life phases contribute to environmental sustainability and human well-being.

4. Data Source Modelling

The analysis of the data sources provided by the various Pilots defined within the "WP2 Operational Architecture", forms the set of information on which to build the Data Source Modelling under consideration.

Therefore, a census was taken of all the databases given, structured and unstructured, explicitly mentioned within the various Pilot Forms under the section "*Brief description of the data already available*".

The table below shows the reported data sources, identifying the pilot partner that makes the information available. Some operational aspects are also defined, such as the availability of the data at the pilot start date, rather than the format of the data (structured e.g., database, unstructured e.g., excel file or paper). To subsequently enable the definition of a correlation model between data source and user pilot, a pilot identifier, called ID-PILOT, is defined.

SPOKE	WP	TASK	PILOT	ID-PILOT	DataSource	From	Available	Structured

SPOKE2	WP2	T2.2	An Assess, WArn & Response (AWARE) approach to monitor and prevent the effects on human health of high-intensity pollution generated by environmental emergencies or disasters, including the effects of climate change and natural hazards.	S2-WP2-T2.2-P01	EMUR (Emergenza-Urgenza)	hospital departments	Y	Y
					AQ (Air Quality) Data	ARPA	Y	Y
					Water Data	ARPA	Y	Y
					Ground Data	ARPA	Y	Y
					Climate Data	ARPA - Regional Meteorological Information System	Y	Y
					Data collected from the Sicilian network of laboratories included in wastewater surveillance system	UNIPA/AOUP	Y	Y
SPOKE2	WP2	T2.3	Implementing an interoperable web-based platform to support health surveillance against latent tuberculosis infection in health care workers and students to define prevention strategies and interventions.	S2-WP2-T2.3-P02	epidemiological, biological, and clinical data of more than n. 2000 subjects enrolled	FPG/UCSC	Y	
SPOKE2	WP2	T2.1	Boostering population-based registries to improve multiple data linkage - LINK	S2-WP2-T2.1-P03	Palermo / Catania / Messina / Enna Cancer Registry		Y	Y
SPOKE2	WP2	T2.3	Model of diseAses related to environmental exposure to heavy meTals, nanopaRticles and emergent	S2-WP2-T2.3-P04	LIMS - (Heavy Metals and nanoparticles)	ARPA	Y	Y

			contaminants, using a dIgital platfOrm of clinical and bio-humoral data: the way to Susceptibility/RisK BiomArker [MATRIOSKA Study].					
					Epidemiological, biological, and clinical data of a subset of individuals with Systemic Nickel Sulfate Allergy Syndrome from a cohort of 140 subjects with food allergy		Y	
					telemedicine data on diet intervention in 20 individuals with SNAS		Y	
					epidemiological, and clinical data of individuals with ACD can be collected from dermatological clinics		N	
					Digital elaboration of data from UNIPA on molecular biomarkers in various organisms or physiological response to pollutants even at low concentrations	UNIPA		
SPOKE2	WP2	T2.1	A population-based digital approach to interoperate cancer registries, specialized clinical/pathology networks and data flows, using suitable data mining solutions (focus on female cancers).	S2-WP2-T2.1-P05	Cancer Registry		Y	Y
SPOKE2	WP2	T2.1	A population-based digital approach to interoperate cancer registries, specialized clinical/pathology networks and data flows, using suitable	S2-WP2-T2.1-P06	Cancer Registry		Y	Y

			data mining solutions (focus on the digestive tract).					
SPOKE2	WP2	T2.1	Interoperating population-based registries and environment monitoring system	S2-WP2-T2.1-P07	Cancer Registry		Y	Y
					AQ (Air Quality) Data	ARPA	Y	Y
					Water Data	ARPA	Y	Y
					Ground Data	ARPA	Y	Y
					Data will be collected from innovative instrumentation measuring measuring individual (indoor, occupational) exposure or the community exposure		N	
SPOKE2	WP2	T2.2	Managing the effects of environmental exposures across the lifespan on health outcomes in different target populations using suitable data mining solutions	S2-WP2-T2.2-P08	EMUR (Emergenza-Urgenza)	hospital departments	Y	Y
					Information on admissions to hospital	Assessorato Regionale Sanità	Y	Y
					AQ (Air Quality) Data	ARPA	Y	Y
					Water Data	ARPA	Y	Y
					Ground Data	ARPA	Y	Y
					Electromagnetic Fields	ARPA	Y	Y
					Noise Analysis	ARPA	Y	Y
					Climate Data	ARPA - Regional Meteorological Information System	Y	Y
					Data will be collected from innovative instrumentation measuring measuring individual (indoor, occupational) exposure or the community exposure		N	

The listed data sources may be supplemented by additional data sources as the WP2 pilots are implemented. The diagram shown will therefore need to be updated in order to properly document the architectural model related to the information feeding the individual pilots, highlighting the presence of cross-pilot information usage.

5. Logical Data Architecture

As SP2 involves the adoption of the AlmaHealthDB model for data management, it will therefore be necessary to define a Logical Data Architecture to integrate the data sources with AlmaHealthDB using tools such as **ETL** (Extract/Transform/Load).

The following tables summarize the list of planned pilots and the list of data sources surveyed during the definition phase of the individual pilots.

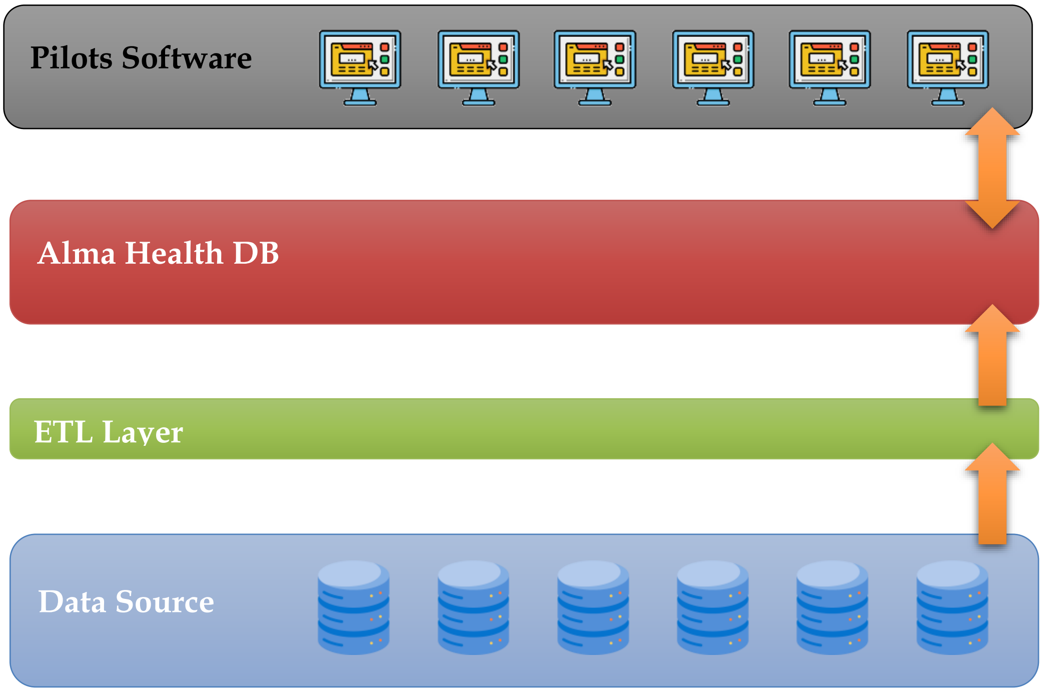
LIST OF APPROVED PILOTS				
SPOKE	**WP**	**TASK**	**PILOT**	**ID-PILOT**
SPOKE2	WP2	T2.2	An Assess, WArn & Response (AWARE) approach to monitor and prevent the effects on human health of high-intensity pollution generated by environmental emergencies or disasters, including the effects of climate change and natural hazards.	S2-WP2-T2.2-P01
SPOKE2	WP2	T2.3	Implementing an interoperable web-based platform to support health surveillance against latent tuberculosis infection in health care workers and students to define prevention strategies and interventions.	S2-WP2-T2.3-P02
SPOKE2	WP2	T2.1	Boostering population-based registries to improve multiple data linkage - LINK	S2-WP2-T2.1-P03
SPOKE2	WP2	T2.3	Model of diseAses related to environmental exposure to heavy meTals, nanopaRticles and emergent contaminants, using a dIgital platfOrm of clinical and bio-humoral data: the way to Susceptibility/RisK BiomArker [MATRIOSKA Study].	S2-WP2-T2.3-P04
SPOKE2	WP2	T2.1	A population-based digital approach to interoperate cancer registries, specialized clinical/pathology networks and data flows, using suitable data mining solutions (focus on female cancers).	S2-WP2-T2.1-P05

SPOKE2	WP2	T2.1	A population-based digital approach to interoperate cancer registries, specialized clinical/pathology networks and data flows, using suitable data mining solutions (focus on the digestive tract).	S2-WP2-T2.1-P06
SPOKE2	WP2	T2.1	Interoperating population-based registries and environment monitoring system	S2-WP2-T2.1-P07
SPOKE2	WP2	T2.2	Managing the effects of environmental exposures across the lifespan on health outcomes in different target populations using suitable data mining solutions	S2-WP2-T2.2-P08

LIST OF KNOWN DATA SOURCES or DATA SOURCE KIND	
ID-DATA SOURCE	**DataSource**
S2-WP2-DS-01	EMUR (Emergenza-Urgenza)
S2-WP2-DS-02	Primary information on patients at the ER admission
S2-WP2-DS-03	SDO (Scheda dimissione ospedaliera) - Information on patients admitted to hospital
S2-WP2-DS-04	AQ (Air Quality) Data
S2-WP2-DS-05	Water Data
S2-WP2-DS-06	Ground Data
S2-WP2-DS-07	Climate Data
S2-WP2-DS-08	Data collected from the Sicilian network of laboratories included in wastewater surveillance system
S2-WP2-DS-09	Epidemiological, biological, and clinical data of the subjects enrolled
S2-WP2-DS-10	Palermo / Catania / Messina / Enna Cancer Registry
S2-WP2-DS-11	LIMS - (Heavy Metals and nanoparticles)
S2-WP2-DS-12	Epidemiological, biological, and clinical data of a subset of individuals with Systemic Nickel Sulfate Allergy Syndrome from a cohort of subjects with food allergy

S2-WP2-DS-13	Telemedicine data on diet intervention in a sample of individuals with SNAS
S2-WP2-DS-14	Epidemiological, and clinical data of individuals with ACD can be collected from dermatological clinics
S2-WP2-DS-15	Digital elaboration of data from UNIPA on molecular biomarkers in various organisms or physiological response to pollutants even at low concentrations
S2-WP2-DS-16	Information on admissions to hospital
S2-WP2-DS-17	Electromagnitic Fields
S2-WP2-DS-18	Noise Analysis

Pilot and data source integrated with the Alma Health DB architecture according to the Data Architecture Logic are illustrated below.



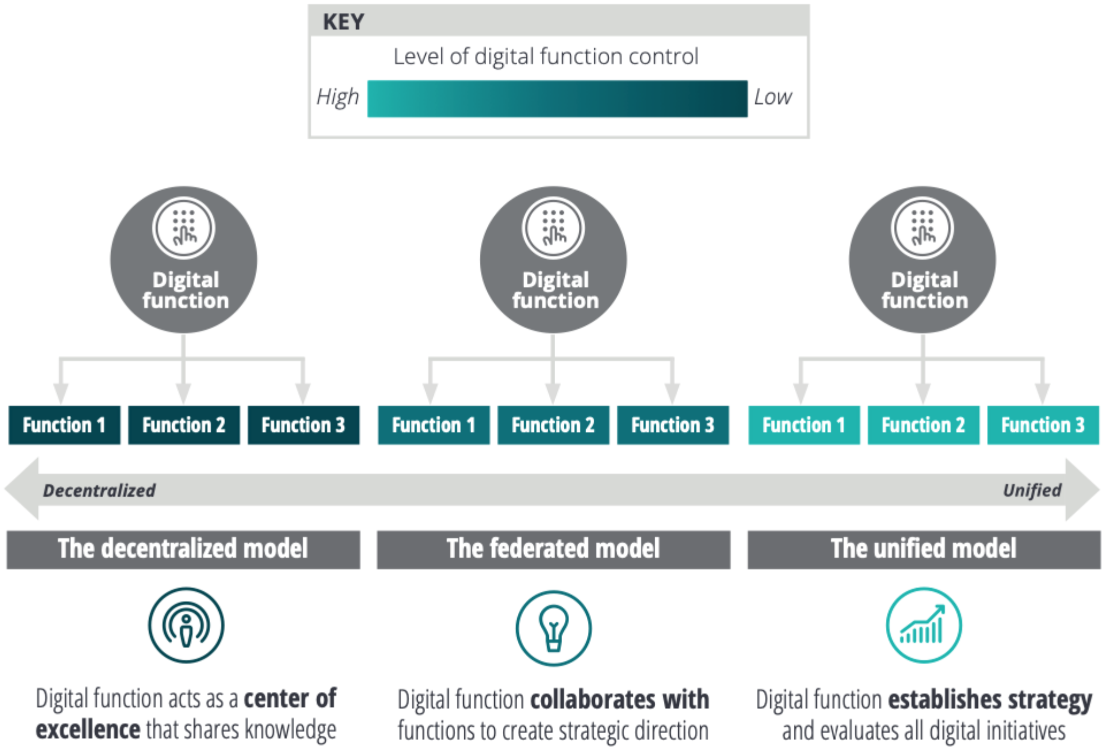
The architecture therefore involves the definition of a specific middleware specialized in the integration of the different data sources and of an ETL bus for the subsequent transformation according to the provisions of the Alma Health DB architecture.

6. Concept of Digital Functions

The hierarchical organization of the DARE project, structured into Spokes, Working Packages, Tasks and Pilots, requires a Concept of Digital Functions to guarantee an adequate level of flexibility in the structuring of the software components relating to the individual pilots.

Three primary operating models are used during digital transformations. Each model is effective, and suitability depends on each individual organization.

The strengths of each model in relation to the application scenario are illustrated below.



The **Decentralized Model** is best suited for organization with:

- Well-communicated and accepted digital function strategy across the DARE.
- Established ways of working and governance mechanisms on digital efforts across function
- Sufficient openness, trust, and digital knowledge for function to operate independently.

The **Federated Model** is best suited for organization with:

- Digital initiative that will affect multiple teams and require cross-functional collaboration for success.
- Strong domain expertise within functional and product teams

The **Unified Model** is best suited for organization with:

- Low levels of digital capability maturity across function
- Digital strategy focused on specific marquee projects.
- Less complex organizational structure requiring limited coordination and program governance.

To allow an adequate level of flexibility in the implementation of the pilots, the adoption of one of the decentralized or federated models is envisaged, to allow the various working groups to operate autonomously by pooling the various analysis tools that will be developed.

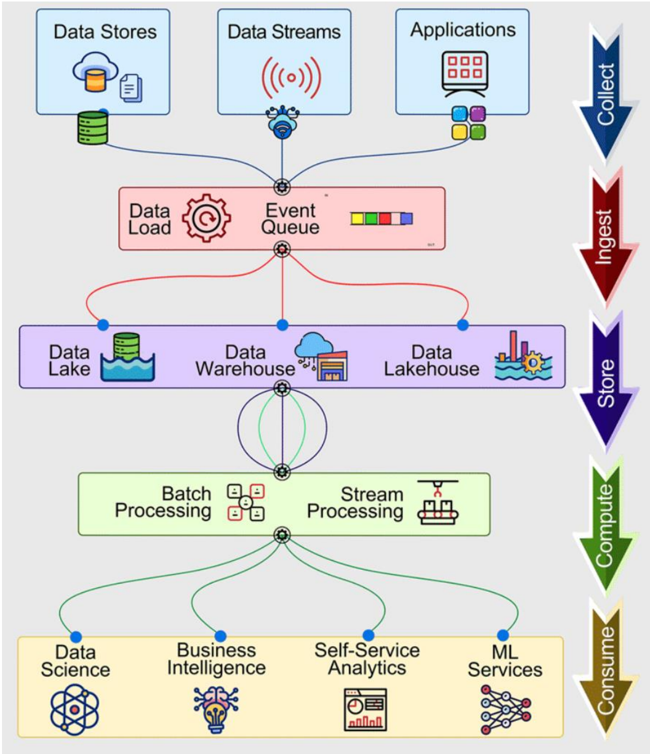
7. Definition of Protocols

The creation of the pilots and the corresponding digital architectures require the definition of protocols and the adoption of methodologies for managing the interaction cycles between the different work groups.

The procedural model shared with all pilots involves a phased information management process. The following image identifies these phases as:

- Collect
- Ingest
- Store
- Compute
- Consume

Each of these phases requires the different teams to define project hypotheses, management procedures or processes, digital solutions to be implemented, and procedures for using the information acquired and processed.



Clearly this logical model involves the use of different types of data sources, technical solutions for their structuring through different data storage models and finally information processing solutions according to the available state-of-the-art technologies (e.g. Data Science, Machine Learning, Analytics, etc.).

Having to adopt a framework that allows us to manage protocols of various natures and heterogeneous work groups operating on different pilots, it is necessary to identify an effective and flexible methodology.

The adoption of **Agile-Kanban frameworks** is therefore envisaged for the management of all pilot development processes in all their components, such as research, processes, procedures, protocols and digital functions.

The **Agile project management framework** is one of the most used processes in project management. However, the reality is that Agile is not technically a methodology, but rather a project management principle.

Basically, an Agile approach:

- it is collaborative.
- it is fast and effective.
- it is iterative and data-driven.
- gives more importance to people than to processes.

When it comes to using Agile, teams often choose to complement it with other specific methodologies, which may include Scrum, Kanban, eXtreme Programming, Crystal or even Scrumban. This is because combining Agile methodology with a more detailed approach creates a well-rounded project management philosophy and a tangible plan for ensuring quality work.

For the management of the pilots relating to SP2, it is envisaged to adopt the Kanban methodology to complement the Agile framework.

Who should use it: Agile framework can be used by practically all teams, as the principle on which it is based is quite universal. The real challenge is deciding which methodology to support.

The agile methodology has an iterative structure based on the phases of

1. Requirements
2. Design
3. Development
4. Testing
5. Deployment
6. Review

The duration of each phase can be defined by the times expected for the realization of the project, rather than a fraction of them where you plan to create multiple agile cycles for the development of the single pilot.

The Kanban methodology represents project backlogs using visual elements, specifically boards. This approach is adopted by Agile teams to have a better view of workflows and project progress, while decreasing the possibility of creating bottlenecks. Furthermore, this methodology usually uses software that allows you to edit and drag boards seamlessly into projects, although this is not a mandatory requirement.

Because this method doesn't have a defined process like others, each team uses it differently. The main concept to keep in mind is that the Kanban method aims to focus on the most important activities of the project, maintaining the simplicity of the overall framework.

Who should use them: Kanban boards are a great tool for teams of any size, especially teams that work remotely. This is because they offer a visual framework that helps team members stay on schedule regardless of where they are.

The image below illustrates the typical representation of information according to the Kanban methodology which classifies the information and project activities into macro areas such as: **Backlog, Doing, Review Done.**

This simple representation of project activities identifies the **activities planned to be implemented** (Backlog), the **activities in progress** (Doing), the **verification phases of the activities carried out** (Review) and finally the **completed ones** (Done).

The structure of the **Kanban Board** can be more complex and include a greater number of phases or classes of activities envisaged for the implementation of the pilots.

While the **Agile Framework** identifies and manages the project phases, the **Kanban Methodology** is aimed at managing the specific activities of the single agile phase, identifying team roles, information management protocol, process validation, digital functionality testing, documentation drafting, etc.

8. API Library Model

APIs (Application Programming Interfaces) are an essential part of modern software development. They enable applications to access and exchange information in a secure and efficient manner while providing developers with the flexibility they need to create innovative solutions. Designing an API architecture is one of the most important steps in developing a successful application.

API Library Model is a set of rules and practices that provide a framework for designing, developing, and delivering web services. API Library Model defines how an application programming interface (API) interacts with the other components in its system.

This includes how APIs communicate with databases, applications, and other systems. It also exposes data with http status code or several status codes, or http status code or several status codes, a http status code that determines how data is exchanged between different components of distributed systems and how external resources associated information are accessed.

The most important aspect of API Library Model is that it enables applications to be built faster while being more robust and reliable than ever before. An API-driven architecture allows developers to quickly create APIs to interact with different systems without having to write complex code or spend excessive time debugging errors with query string parameter.

With modern tools like RESTful APIs, developers can easily integrate existing data sources with existing resources, such as databases as well as third-party web services, allowing for quick delivering of powerful, yet mobile, applications.

API Library Model is a set of components and guidelines for creating, managing, and consuming APIs. It is the foundation on which an organization can build successful API programs. When properly designed and implemented, it helps to ensure that APIs are reliable, secure, scalable, and easy to use.

The most commonly used components of an API Library Model in RESTful applications include:

- **Data Model:** A data model encapsulates the structure of the data that will be exchanged between clients and servers through the API. This includes elements such as objects, attributes, and relationships between objects. The models should be designed to provide maximum flexibility while also allowing for system scalability and consistency across different client applications in rest APIs.
- **Endpoints:** An endpoint is a specific URL that allows clients to make requests and the server side receives responses to http requests. A good web API architecture

should have well-defined endpoints to ensure the correct content type header data is returned for successful response to the request body of http header a given request, which is a straightforward process.

- **Authentication and Authorization:** This component of an API architecture provides authentication (verifying users are who they say they are) and authorization (determining what data or actions they can access). This can be done using tokens, OAuth 2.0, and other methods with status codes.
- **SDKs:** SDKs (Software Development Kits) provide developers with easy-to-use programming libraries, API management tools, and documentation to quickly build applications that access an API's services. These pre-built components save time as developers usually don't need to understand the inner workings of an API.
- **Versioning:** This component allows for different versions of an API to exist side-by-side, ensuring that existing applications are not broken when changes are made to major or less major version number of the underlying codebase. It also allows developers to test new features with the same version number on select group of users before being released to everyone.

By understanding these components and implementing them into an API architecture, organizations can ensure successful API delivery that is reliable, secure, and easy-to-use. This in turn will help them maximize the value of their APIs and create a positive experience for users in open API specification.

The pilot implementation process will contribute to the definition of all the technical aspects relating to the components of the API library corresponding to the Pilot. This library formalizes the data model underlying the pilot, the generic client's access point to the application library, client authentication mechanisms and predefined application functionalities.

Through the API libraries, the pilot's data and application functions may be available to other application components of the DARE architecture for reuse on other pilots or subsequent developments and evolutions of the technology.

The typical structure of the API libraries includes a hierarchical organizational model. The application functions will be classified for each individual pilot and will include access functions to individual data sources, correlation between different data sources, or simulation and modeling according to the different algorithms and analysis protocols that can be developed during the implementation phase of the individual pilots .

The typical structure of the API Library Model is the following:

< API Library Model>

<Pilot – Project Code>

<DataSource – Data Import Functions>

Data import functions from data sources to Alma Health DB

</DataSource – Data Import Functions>

<DataSource – Data Access Functions>

Data access functions from Alma Health DB

</DataSource – Data Access Functions>

<DataCorrelation – Data Correlation Functions>

Data correlation functions from Alma Health DB

</DataCorrelation – Data Correlation Functions >

<DataModeling – Data Modeling Functions>

Data Modeling functions from Alma Health DB

</DataModeling – Data Modeling Functions >

<GISDisplay – Data GIS Display Functions>

GIS Display functions from Alma Health DB

</GISDisplay – Data GIS Display Functions>

….

</Pilot – Project Code>

< /API Library Model>

For each class of application functions necessary for the implementation of the pilots, a specific section must be prepared within the API Library Model managing the versioning of the libraries.

9. Conclusions

This document encapsulates the meticulous design and the strategic implementation of digital functions, protocols, and API models, aimed at establishing an efficient interoperating layer among the various pilots encompassed within WP2 of SP2 in the D.A.R.E. Project.

Drawing from a comprehensive understanding of different data source models and logical data architectures as the foundation of our "internal" data structure, the development of this interoperating layer stands as a testament to our commitment to fostering unified, secure, and accessible data integration. This layer, rooted in established technologies and best practices, ensures not only the consolidation of data but also provides crucial aspects such as isolation, modularity, and stringent access control.

Central to the success of the pilots and their user-centric nature, the recommendation for decentralized or federated models for digital functions (see Section 4) underscores our commitment to adaptability and user-centric design. This approach ensures agility, autonomy, and tailored functionalities within the diverse operational contexts of the pilots. Moreover, our adoption of an Agile methodology, specifically leveraging the Kanban approach for protocols (as highlighted in Section 5), represents our dedication to dynamic, iterative processes, fostering responsiveness, and continual improvements. This methodology aligns seamlessly with the evolving needs of our initiatives, ensuring streamlined operations and efficient progress.

The API model's pivotal role in translating these functions and protocols into practical endpoints, facilitating seamless access to the services provided, underscores our dedication to user accessibility and service-oriented design. These endpoints not only democratize access but also ensure the ease and efficiency of interaction with our advanced digital infrastructure.

In conclusion, the culmination of these endeavors represents a monumental step forward in redefining primary prevention initiatives within the healthcare landscape. By pioneering innovative digital solutions, fortified by meticulous protocols and agile methodologies, we stand poised to usher in a new era of healthcare strategies characterized by adaptability, responsiveness, and transformative impact.

10. References

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