CLOUDIFY
NoiPA

# Executive Summary

## *HL design e Project Plan*

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UNIONE EUROPEA
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PON GOVERNANCE E CAPACITÀ ISTITUZIONALE 2014-2020

MEF Dipartimento dell'Amministrazione Generale, del Personale e dei Servizi

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# INDEX

# 1. DOCUMENT OBJECTIVES AND GOALS

This document summarizes the high-level design of the digital transformation program Cloudify NoiPA.


The following pages describe the transformation processes put in place by the program in order to:

- Identify the technological and application macro-solutions needed to achieve the program objectives;
- Define the organizational and change management solutions supporting the change process within the Information Systems and Innovation Directorate (DSII) and minimizing the impact of the program on the users.

The Cloudify NoiPA program determines a complete transformation of the operations architectural model and of the delivery model of NoiPA services.

**Figure 1. ADM: Architecture Development Method**

For the design of Cloudify NoiPA's architecture, the DSII decided to follow the TOGAF (The Open Group Architecture Framework) methodology, based on the Architecture Development Method (ADM), which provides a global approach to the design, planning, implementation and governance of the information architecture. The phases of the ADM cycle, shown in the picture, are defined as follows:

**A. Architecture Vision.**

Establishes the scope, constraints and expectations of the ADM cycle.

**B. Business Architecture**

Develops a business architecture supporting the *Architecture Vision*.

**C. Information Systems Architectures.**

Describes the main information systems, the information processing applications, and the relationships between them and with the environment.

**D. Technology Architecture.**

Describes the hardware, software and communication technologies and the relationships between them and with the environment.

**E. Opportunities and Solutions.**

Identifies the main implementation projects and groups them in work packages.

**F. Migration Planning.**

It deals with the detailed planning of the migration (transition from the Baseline to the Target architecture).

**G. Implementation Governance.**

It defines the organizational methods supporting the correct implementation of the projects.

**H. Architecture Change Management.**

Ensures that the architectural changes are managed in a controlled manner

# 2. ARCHITECTURE VISION

## 2.1 THE DIGITIZATION PROCESS IN THE ITALIAN PA

In the last ten years, the Italian Public Administration has embarked on a path of reform and modernization aimed at redesigning its role and offering integrated, simplified and personalized services.

All this requires a change in the approach based on efficiency and performance as fundamental values for a public service increasingly centered on citizens and businesses needs.

The modernization of the PA is a critical issue for Italy and the European countries. Adapting to globalization and to the competition of emerging countries means having the ability to find the right balance between service quality and its costs, which are necessary to finance public services without getting into debt.

To better understand the process of digitalization underway in the Italian PA it is useful to refer to its regulatory context. The legislative framework of reference includes three main sources: the European Digital Agenda, the Italian Digital Agenda - defined with the aim of bringing Italy to the full implementation of the European one - and the renewed Digital Administration Code (Legislative Decree No. 82/2005) which includes some provisions defined by the Italian Agenda.

## 2.2 THE EUROPEAN DIGITAL AGENDA (ADE)

The European Digital Agenda (ADE) is one of the seven flagship initiatives of the European Union's "Europe 2020" strategy, which aims to ensure sustainable, inclusive and smart growth.

Launched in May 2010, its main objective is to promote better conditions for economic growth and employment in Europe through the review of the digital priorities, the spread of the broadband, the creation of new infrastructures for digital public services, the development of digital skills, Cloud Computing and through the implementation of a new industrial electronics strategy.

Among the new digital priorities, the adoption of Cloud Computing in the public sector is of particular relevance for the definition of a reference IT architecture for the Italian Digital Agenda.

## 2.3 THE ITALIAN DIGITAL AGENDA AND THE CAD

In response to the requests made by the European Digital Agenda, in March 2012, the Italian Government has established the Italian Digital Agency (AGID), the national reference authority at the international level and within the European Union, assigning it the tasks of coordinating the actions of central and territorial administrations and defining the State Digital Agenda.

The digitization pillars concern the digital identity and the creation of innovative services for citizens, digital administration, digital education, digital health, broadband and ultra-broadband spreading, money and e-invoicing, and finally digital justice.

Issued in 2005, the Digital Administration Code (CAD) contained indications on the digitization and interoperability processes of public administrations in order to ensure more efficient and effective public action.

In December 2010, a new version of the document was created to include new elements that have become, over the five-year period, fundamental for the strategic approach to the digitization of public administrations.

The latest amendments to the Code were made with the decree of September 2016 which, by adopting the "digital first" principle, introduced the concepts of "digital domicile" and "digital identity" aiming at making the relationship between public administrations and citizens more "open and transparent" thanks to the digital technologies.

The change path underway aims to bring Italy towards a new paradigm, a new way of understanding the administration, in which the evolution of public information technology represents the lever for the economic and social development of the Country.

There are three fundamental elements for the definition of a coordination model for the digital transformation: the Stability Law, with the incentives for the Public Administrations, the three-year AGID information systems plan of the PA, and the CAD reform enabling act, which would allow private individuals to access the public connectivity system to implement new services.

The intention is to spread the services allowing public and direct access, trying this way to go beyond the idea of Open Data.

Since 2016, the public administrations started a convergence process aimed at adapting their information tools to the new Public Administration the information system evolution model (Figure 2).

This model, its principles, and the cost and performance objectives of all its components are presented in the three-year PA information systems plan, presented in 2016 in its first version.

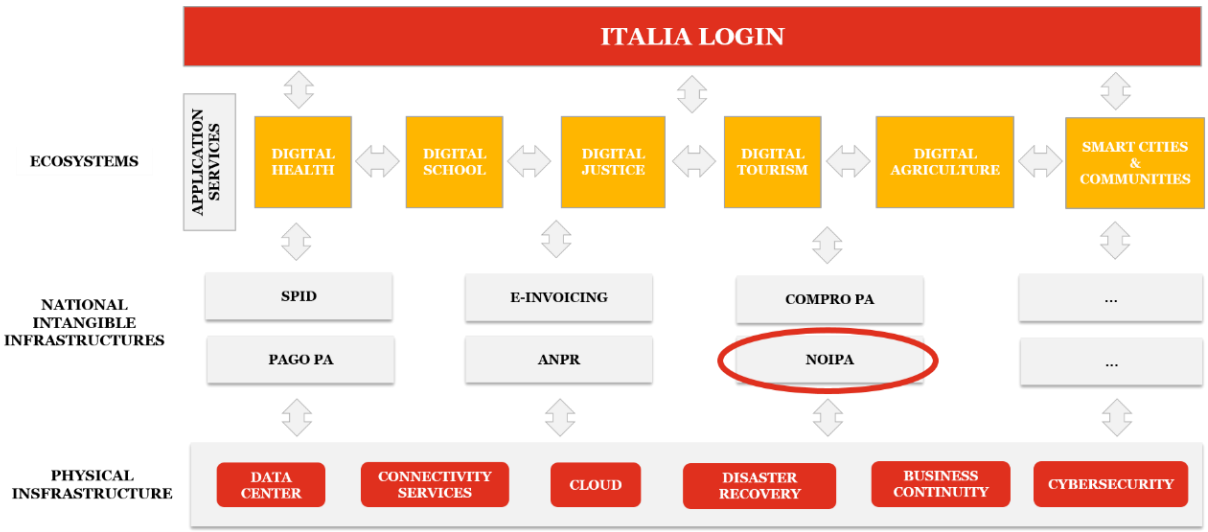


**Figure 2. The ICT strategy model of the Italian PA**

One of the national intangible infrastructures presented in the plan is the NoiPA system, of which Cloudify NoiPA represents an evolution.

The model is an integral part of the 2014-2020 Growth Strategy, approved by the European Commission and presented in March 2015.

## 2.4 THE CLOUDIFY NOIPA PROGRAM

The challenge of a "digital" Italy lies in being able to seize the opportunities of the digital transformation, understood as a change enabled by the new technologies. This transformation affects people and businesses, influencing entire segments of society as well as public administrations, which are in turn called to embrace the digital technologies to manage in new ways public affairs. Cloudify NoiPA aims at accelerating the digital process that will allow the creation of the Italian public personnel management system.

By widening the number of administrations served, increasing the quantity and type of services available and innovating the delivery model, the new system will favor the digital transformation path, taking advantage of the *cloud* paradigm.

Cloudify NoiPA is a digital transformation program funded with € 68.5 million coming from the Complementary Action Program (PAC) of the National Operational Program (PON) "Governance and Institutional Capacity 2014 - 2020", managed by the Territorial Cohesion Agency , with resources under the rotation fund for the implementation of community policies (Article 5 of Law 183/87). The expected objectives of the Program are:

- To make operational - through the largest Italian public cloud services platform - the largest shared service of HR management services in the world;
- Accompany the digital transformation process of the Italian Public Administration, acting on one of the core management processes of the administrative machine;
- Provide certain, timely and structured information concerning public employees to the administrative governance, the decision makers, citizens and businesses.

Given the identification of these expected objectives, an intervention strategy, divided into three lines of action, was defined. This can be summarized as follows:

- Implement the new public personnel management system, able to cover all personnel management administrative processes: from integrated salary services to attendance services up to legal and advanced HR services.
- Implement the database of the PA personnel, making available valuable information to support policy-making actions for the public administration and for citizens.
- Adopt technological innovation paradigms and organizational models (community, multi-level delivery, digital by-default, co-creation and self-provisioning) able to better respond to the requests of public administrations.

The project, conceived and designed on the basis of a successful initiative, as it was and is NoiPA, will involve the following areas:

**A.** Service model and/or extension of the range of services offered to the bodies already managed.
**B.** Application architecture and new software solutions.
**C.** Data analytics.
**D.** Infrastructure, security and service management methods.
**E.** Acquisition of new administrations and services extension.

## 2.5 WHY CLOUDIFY NOIPA

Cloud Computing is increasingly the subject of attention of the Italian public administrations because it allows the improvement of operational efficiency and the achievement of significant economies of scale.

In the case of Cloudify NoiPA, the adoption of the cloud computing paradigm will allow the achievement of efficiency targets and greater usability of the service offered. The "cloudification" of the current NoiPA system is the technological solution identified to integrate and harmonize the solutions necessary to face the following future challenges (expansion of the functional range of services and of the number of users/bodies served):

- Development and consolidation of a catalog of common and modular services able to ensure standardization of the delivery methods and at the same time the full compliance to the specific characteristics of the institution;
- Chance for each institution to activate the services in self-provisioning mode (through the composition and configuration of micro-services);
- Centralized management of the operations and strengthening of the shared service model (Service Provider).

Acting as a symbol of the modernization of a state capable of creating innovative digital services, Cloudify NoiPA will be the place where all information related to each Italian public employee will be

located in. A revolution that will require a precise and targeted design and a service oriented architecture, in which the emphasis - even for the infrastructural levels – will be placed on the service and no longer on the product.

## 2.6 THE DESIGN APPROACH

The design model chosen for Cloudify NoiPA aims to put together the standardization of the processes needs (efficiency) - through their rationalization and centralization - with the customization and functionalization of operational needs (effectiveness) - through e-democracy, co-operation and user-centricity approaches.

The user, therefore, with his experience becomes the center of service, applications and functionality design.

In the design phase, the implementation of co-design models considering all the different needs (user, operator, Administration, DSII, institutional stakeholders, direct and indirect Partners, citizens and businesses) in the appropriate perspectives becomes therefore essential. The need therefore is to ensure the "spaces" of coexistence between the various program production chains (software and architecture development and implementation, service model and change management levers implementation) and the provided service continuity.

Users, with their needs and previous knowledge, participate directly in all phases, contributing with their experiences to the program outputs. Drawing on similar projects best practices, a set of rules to be implemented in the program was therefore defined:

- Cloud first: essential technology for a service that wants to fully exploit the knowledge and benefits of the national and international innovation frontier;
- Micro-services approach: the application functionalities must collect "packages" of elementary services. Such micro-services can be common to all the sectors managed or sector/scope specific.
- Modularity*:* The program must provide integrated modules (micro-services packages) within a catalog of services;
- Data governance: data quality must be designed, guaranteed and managed end-to-end – from the generation to the use of data through automatic controls throughout the whole technology stack. Regarding Data Security instead, NoiPA information assets must be managed to be shared and enhanced, supporting - in compliance with security, quality and confidentiality rules - all stakeholders' operational and decision-making processes.

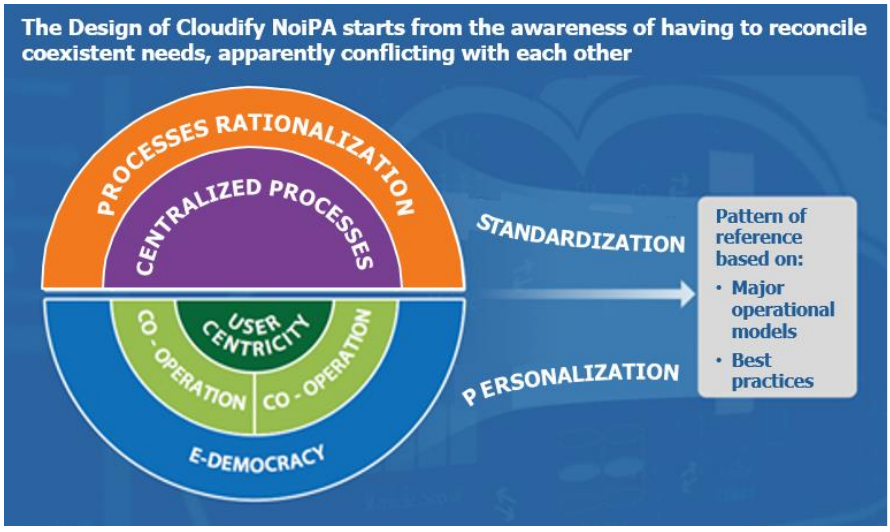


**Figure 3. Cloudify NoiPA design approach**

# 3. BUSINESS ARCHITECTURE

The primary object of Cloudify NoiPA is the creation, implementation and delivery of a new service model, understood as the set of functionalities/services, customers relations, technological and organizational enablers allowing the DSII to deliver the service to its clients. The design of the future NoiPA model is here presented by listing the details: service catalog, types of stakeholders involved, illustration of the different elements of the NoiPA service provision model.

## 3.1 SERVICE CATALOG

Cloudify NoiPA service catalog, structured in a business perspective, will allow:

- Clearly define what is offered to the PAs;
- Support the activities and processes analyses;
- Accompany the management of support services and suppliers;
- Improve the Service Level Agreements (SLA) management;
- Support the clear identification of the necessary skills and of the correct organizational structure.

In particular, the program envisages the following articulation:

- "NoiPA Pack", including the services related to all the public HR administrative processes in line with the provisions of the AgID Plan;
- "Additional Services" of training and assistance.

The services will cover the employee "relationship cycle" with the Administrations: Selection, Hiring, Development, Management and Dismissal. The construction of the new service model starts from the identification of all the subjects directly or indirectly involved in the service provision or interested in any way:

- Institutional stakeholders: subjects who perform policy-making roles, and which are interested in the development of the service;
- Partners: subjects contributing directly;
- Administrations served: subjects currently receiving the service;
- Prospects: potential new customers;
- End user: service recipients.

The Cloudify NoiPA service will follow two delivery models: "direct" delivery and "indirect" delivery.

In order to ensure the full satisfaction of operators and administrators, and to be embeddable in the proprietary systems of the participating organizations, the services will be designed in a user-centric logic. In case of indirect delivery, the intermediary subjects, distributed throughout the country, will be involved in agreements with NoiPA and will participate in the service provision, facilitating the dialogue between Cloudify NoiPA and the participating public bodies.

The intermediaries will be able to participate in the agreements with the institutions phase, in the collection and in the supply of data, in the provision of services like assistance and training, and inthe public body dismissal phase.

## 3.2 SERVICES CHARACTERISTICS

Cloudify NoiPA will be a cloud as a service software allowing a broad-spectrum personnel management. No component of the service will hence need to be installed at the clients premises.

The service will be organized in a modular architecture, consisting of independent and embeddable modules. It will be flexible - without prejudice to regulatory and mandatory constraints - and embeddable in an interoperable way, with external software services. In this way, other software will be able to provide input data to feed the services and take advantage of information in output coming from NoiPA. Integration will also be possible with the information systems of direct, indirect and institutional partners.

The (cross-service) process approach will also be fundamental for those entities that, given their small size, manage all the services provided by NoiPA from a single office. In the case of a single user, which manages the end-to-end process, it will be possible to use the system without process interruption and without the need for task segregation, accessing different input masks and waiting for processing in background.

The NoiPA service will be available in multi-channel mode on various web and mobile platforms. The services will be accessible from mobile, for both operators and users. A smartphones and tablets app will be available on the online stores of the main mobile operating systems.

Cloudify NoiPA will enrich its offer also through its presence on social networks: official pages and work groups will be available on the most suitable social networks to reach the service audience (eg Facebook or LinkedIn).

The service will be available 24 hours a day, 7 days a week. During the regular salary data processing phases indeed, the services will still be available for ordinary management. The automatic processing management will therefore allow each administration to choose independently the automated procedures execution dates. This will permit the current month salary data processing, the previous month additional remunerations settlement and the processing simulations on a dedicated area.

# 4. INFORMATION SYSTEMS AND TECHNOLOGY ARCHITECTURE

The chapter presents the reference technological model for Cloudify NoiPA.

## 4.1 ARCHITECTURAL VISION

The architectural solution is based on the following project peculiarities:

- The **geographic and heterogeneous connotation** of the administrations, both in material and immaterial terms;
- The **access channel** type, considered in terms of flexibility and heterogeneity with respect to the needs of the administrators and of the end users;
- The **conservation and enhancement** of the tangible and intangible infrastructures of the administrations.

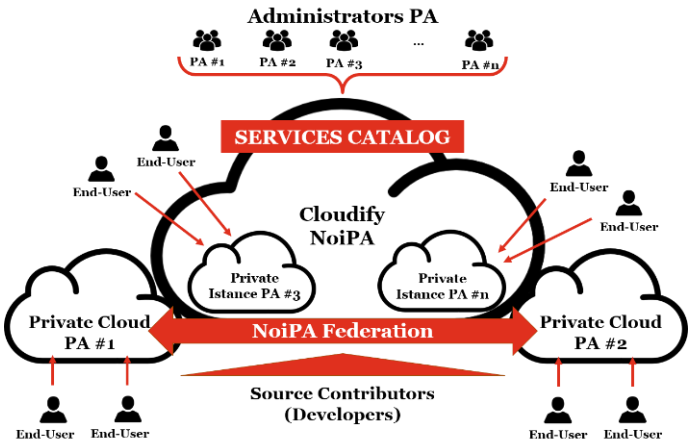


**Figure 2. Cloudify NoiPA architectural vision**

In order to preserve these peculiarities, the architectural design was built on the basis of the following macro-areas (nodes):

- Cloudify NoiPA: it is the architectural element enabling the solution, configured according to the Hybrid Cloud model. Cloudify NoiPA, will deliver application services to its end-users, and guarantee centralized governance for Accounting, Provisioning, User Profiling and Monitoring of the services included in the catalog;
- Private Node: it represents the local authority with its own infrastructure willing to use the services provided by Cloudify NoiPA, in a federal logic. The federation between "Cloudify NoiPA" and the "Private Node" will take place both at the physical infrastructures level (data-centers) and at the intangible infrastructures level (application services);

- Private Instance: it represents the local authority, without its own infrastructure, willing to take advantage of the application services made available by Cloudify NoiPA, in a software as a services logic.

Cloudify NoiPA will guarantee interoperability for the identified scenarios (Private Cloud and Private Instance), and allow the integration of public authorities application and platform services thanks to the availability of:

- **Configuration Management** directly available to the Cloudify NoiPA platform administrators to manage the entities served in terms of intangible and tangible infrastructures (federation);
- **Services Catalog** available to the administrators of the local public bodies to operate in complete autonomy, purchase and configure the services of interest available in the catalog.

## 4.2 THE FOUNDING TECHNOLOGICAL PRINCIPLES: CLOUD AND MICRO-SERVICES

The paradigm adopted for Cloudify NoiPA is Cloud Computing. The following figure shows the typical layers of a cloud stack as promulgated by NIST (The NIST Definition of Cloud Computing) highlighting the typical users of each layer.

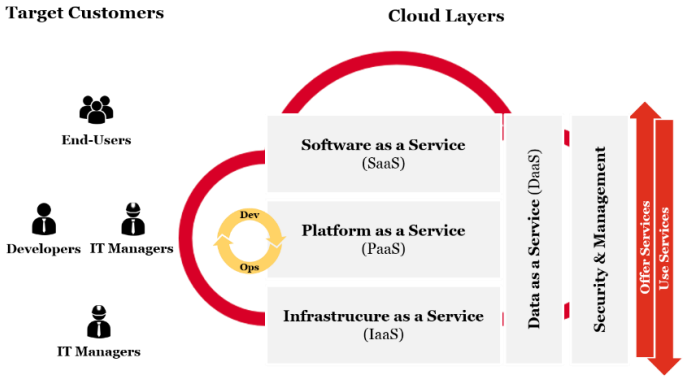


**Figure 3. Stack Cloud**

The main advantages exploited by the Cloud Computing paradigm are:

1. Agility and scalability: to allow the infrastructure growth in line with the diffusion of the service and to ensure a dynamic provisioning of resources ("on-demand");
2. Reliability: to ensure operations continuity, making the most out of the available infrastructural resources and exploiting the platform virtualisation;
3. Cost containment: thanks to the centralized use of infrastructural resources and the sharing of resources and investments on a growing pool of users;
4. Multi-tenancy: possibility to instantiate services to the specific organization, preserving confidentiality and security of access;
5. Security: guaranteed by data centralization, resource monitoring and distributed authentication through integrated access control;
6. Metering: to constantly monitor the resources used by each *client*, by *client* groups and by individual services;
7. Possible definition of services cost reimbursement in a *pay-per-use* logic.

Figure 6. provides a summary of the software development model evolution and highlights the adopted reference paradigm for each of the implementation areas.

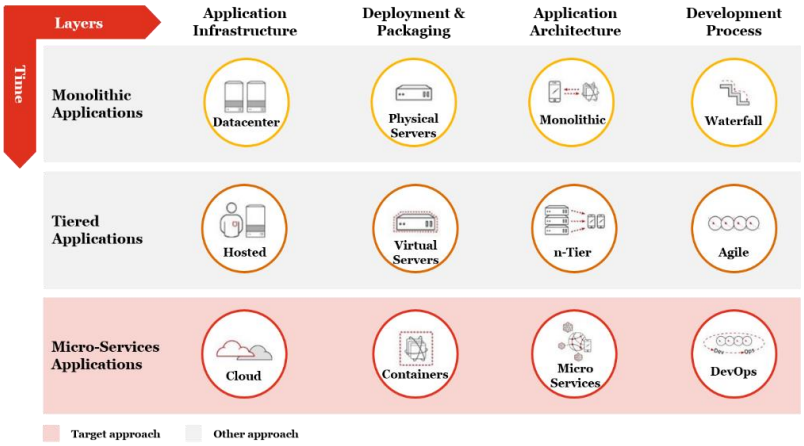


**Figure 4. From monolithic applications to micro-services applications**

An application with a micro-service architecture is typically composed of atomic services, each running in its own "isolated perimeter", that communicate with each other according to standard and "light" protocols (typically API RestFUL).

Each service identifies a particular business function, including databases and calculation processes, independently deployable.

The development of micro-services architectures has significant advantages, for example:

- Each micro-service is a separate entity generally published on a PaaS platform;
- The micro-service is seen as a blackbox and the exposure through APIs allows an abstraction from the implementation detail (language or technology used);
- Each micro-service can be issued independently of the others, allowing a higher frequency of deployment;
- The increase in the level of tests automation is conducted on the various services in isolation.

Within Cloudify NoiPA, a service is a business unit that identifies the single user functionality.

The single service can be divided into a sequence of 6 macro-components, which can in turn correspond to different classes of micro-services:

- Acquisition: the micro-service presents one or more methods of dialogue with the caller based on technological recognized standards and plays the role of semantic and syntactic verification of the call;
- Supply: it is the micro-service component responsible for acquiring the necessary data for the processing process (rules to be applied, metadata, reference data, etc.). Different feeding methods can be defined (from internal micro-services for accessing internal data and information or from external flows for integration with third-party services);
- Elaboration: it is the portion of the micro-service related to the execution of the specific micro-service business/process logic;
- Artefacts production: this is the portion of the micro-service used in the creation of documents, data, reports and information generated by the processing process;
- Extraction: it is the component of the micro-service used in the preparation of output data;
- Fruition: it is the portion dedicated to the presentation of the extracted data. The micro-service will be able to expose the result in one or more ways (e.g. via web or API).

The six generic macro-components of a service can be configured by the administrations served on the basis of specific compatibility rules depending on their needs, thus defining the mini-service for the specific institution. Figure 7. represents **the relationship between service, mini-service and micro-service.**

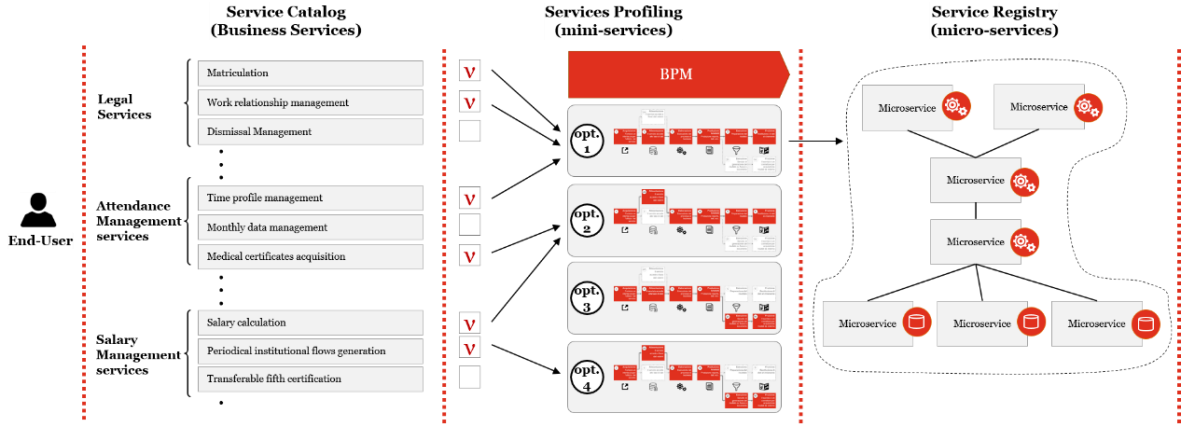


**Figure 5. Service, Mini-service, Micro-service**

## 4.3 ARCHITECTURAL MODEL

On the basis of the adopted paradigm, during the HL Design phase the "building blocks" of the Cloudify NoiPA platform have been defined and positioned inside the layers (Figure 8)

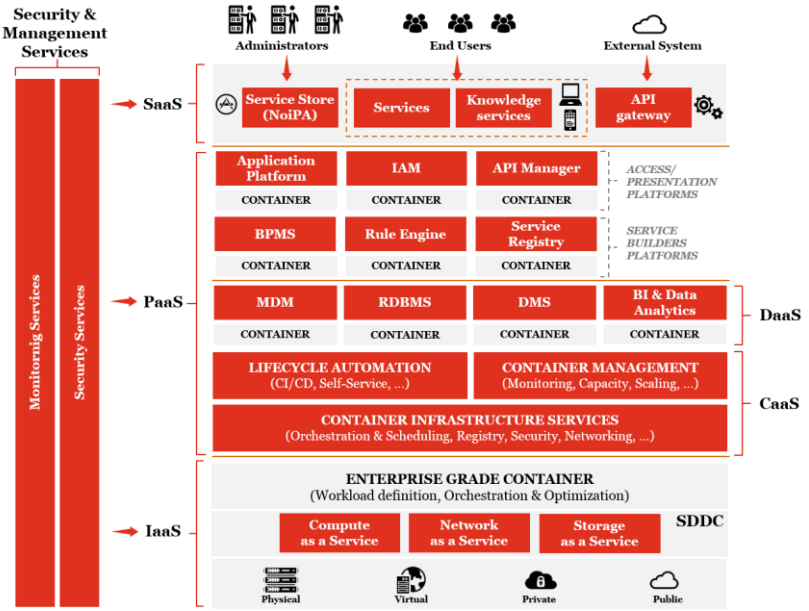


**Figure 6. General High level architecture of the Cloudify NoiPA solution**

Through the architectural model defined, it will be possible to:

1. **Offer Self Service Configuration services;**
2. **Offer public API** (Application Program Interface): provide services and open-data, freely available through a Gateway API to the external parties in application cooperation with Cloudify NoiPA (which defines the rules of use in terms of authentication, parameters, flows, etc.);
3. **Offer a uniform user experience.**

The design of the system infrastructure and IT processes will be based, at a high level, on the following assumptions:

- Development and continuous evolution of the current process system, through the implementation of an improvement process;
- Reference to the recognized models, mainly ITIL and CobIT;
- Design and implementation of a processes performance monitoring system allowing the best planning of the improvement process actions possible;
- Integration of the processes monitoring system with the information system monitoring system.

The architectural model described represents the target scenario for the Cloudify NoiPA solution.

The strategic approach includes the following macro-phases:

- **Vision (pre-planning):** the macro-requisites (business and non-business) and the technological enablers essential to deliver services according to the cloud model are defined and classified;
- **Evaluate and Design (design):** for each of the technological enablers identified, both a tactical approach (short term) and a strategic approach (medium / long term) are defined in order to preserve the design and ensure the evolution of the Cloudify NoiPA platform, both in infrastructural and applications terms;
- **Delivery (execution):** engineering, installation, configuration and provision of the new Cloudify NoiPA services according to the new cloud computing model.

During the design phase, it will be of fundamental importance, to define the positioning and evolution of the various services provided by Cloudify NoiPA within a well-defined roadmap, both of applications and infrastructural terms.

## 4.4 SOFTWARE DEVELOPMENT METHODOLOGY

For the design and implementation of the application components, due to the complexity of the services offered and to the lack of modularity / possibility of reusing the code, the adoption of an Agile development model based on the SCRUM framework in line with the strategic approach defined in the "Stacey Matrix" is suggested (Figure 9).

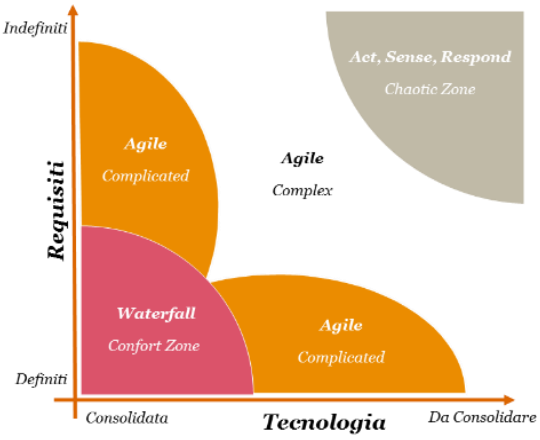


**Figure 7. Stacey Matrix**

The Agile SCRUM framework is based on the following patterns:

1. Reduce the complexity of business requirements / services;
2. Predict future iterations for both the analysis and design phase;

3. Develop the services identified according to a roadmap consistent with the requirements and business priorities;
4. Verify the results obtained both in technological and business terms;
5. Review the services decomposition logic and / or the planning (roadmap) after the results obtained.

## 4.5 SYSTEM INTEGRATION THROUGH APIS

Cloudify NoiPA will be equipped with an "API Management" platform consisting of the following macro components:

- Gateway API: it will be engineered to deliver APIs to both internal and external systems, ensuring technological and protocol abstraction;
- API Manager: it will offer orchestration and support functionalities to the development team (documentation, mock-ups, API stubs, etc.).

The adoption of API Management platforms within the Cloudify NoiPA solution will have to facilitate the integration of external systems through secure server-to-server interfaces. The following figure shows the typical layers of a software architecture with service exposure based on API Management platforms.

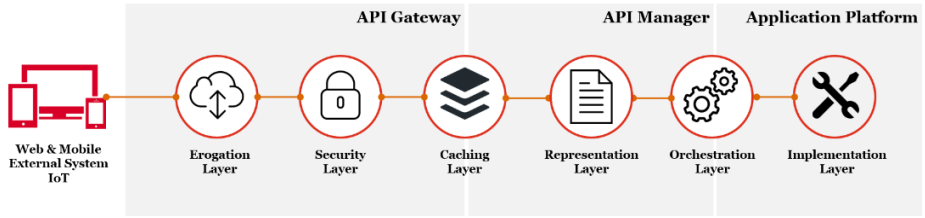


**Figure 8. API Management solution architecture of reference**

## 4.6 SECURITY FRAMEWORK

The safety methodology proposed is embodied in an iterative model of continuous improvement, within which all the standards and regulations of the sector will be framed. The following steps show at the high level the steps to be followed for the definition of the ICT security plan for Cloudify NoiPA:

1. Contextualization of the framework: Adaptation of the methodology supporting the different needs and priorities (application context, data / information, infrastructural context).
2. Priorities and intervention areas: Identification of the field of application, of the areas, of the functionalities and of the services to be addressed by the intervention and of the strategic objectives.
3. Identification of the current profile: Assessment of the current situation and the level of safety and risk exposure according to the areas envisaged.
4. Risk assessment: Evaluation of the risks to which the different areas are exposed and identification of threats and vulnerabilities.
5. Identification of the goal profile: Identification of the list of actions and of the physical, logical and organizational ICT security measures.
6. Analysis of variances: Comparison between the current profile and the target profile and analysis of the differences that must be filled for the management and reduction of the Cyber risk in relation to the strategic objectives.
7. Implementation plan: Definition of the priority action plan aimed at reaching the target profile, based on the criticality of the identified risks and on the regulatory references.

The figure below shows the information flow, which allows to provide solutions mitigating the assessed risks.


**Figure 9. NIST Cyber Security Information flow framework**

## 4.7 THE DEVOPS METHODOLOGY

With the consolidation of the architectural models based on cloud computing and applications provided in the "as-a-service" logic, new methods minimizing the time to market of the solutions / products and guaranteeing at the same time a high quality of deliverables have emerged.


**Figure 10. The DevOps model**

The DevOps methodology is one of the emerging methodologies following this direction. Based on the constant communication and collaboration of all the IT staff, it tries to balance the development teams needs for continuous releases with the operations teams need to offer stability and security.

In order to be correctly implemented The DevOps methodology requires a series of automation tools integrated with Container as A Services platforms capable of enabling scenarios (Figure 13) of:

- Continuous Integration: methodologies and processes automating the project integration.
- Continuous Delivery: methodologies and processes for continuous software improvement.
- Continuous Deployment: methodologies and processes aiming at ensuring the continuous alignment of production environments.


**Figure 11. DevOps application scenarios**

For each identified scenario, the figure highlights the macro areas composing it. The software production process will necessarily have to be supported by tools able to manage the software artifacts life cycle (services, libraries, applications, containers, etc.) produced by the development team and to certify its quality.

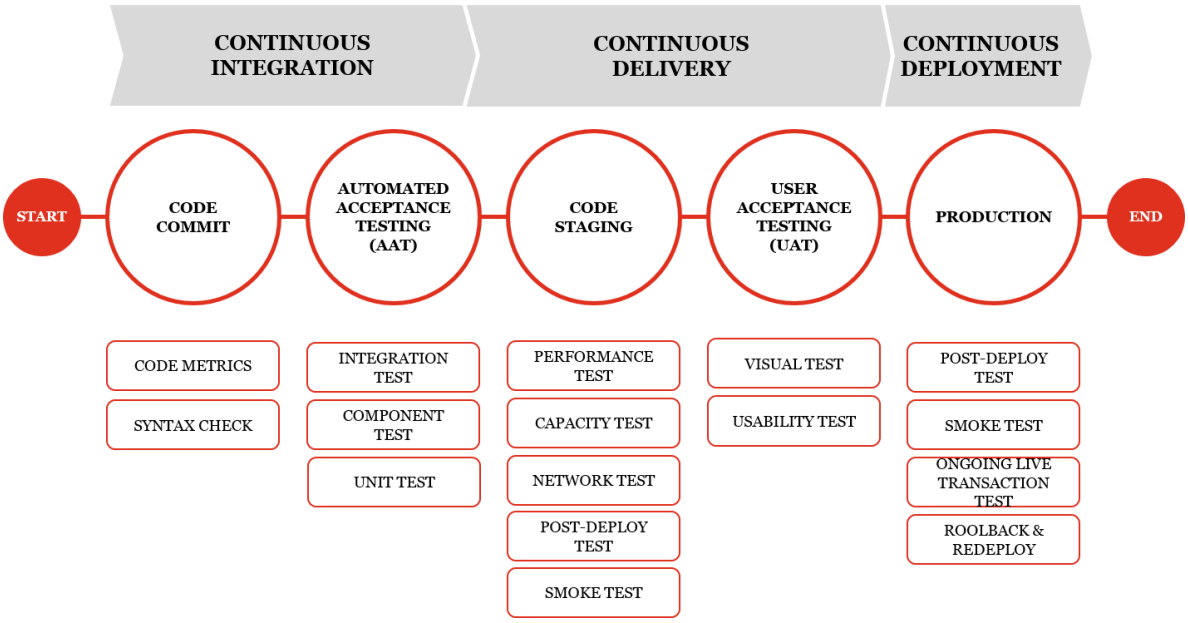


**Figure 12. DevOps area and application scenarios**

The adoption of the DevOps methodology within an IT organization guarantees immediate benefits, including:

- **Quality increase**: the adoption of the Agile model within DevOps based on an incremental model makes it possible to guarantee an increase in the perceived quality of the software;
- **Better release coordination**: the presence of tools helping to manage and coordinate the release pipeline reduces the gaps between development and operations;
- **Automation**: complete automation ensures easy repeatability of releases and reduces errors in the installation operation.

## 4.8 DATA MODEL

Considering the NoiPA system services increase and improvement, an effective data management and an information governance using strategies, standards and rules for the enhancement of the information assets and guaranteeing their most profitable use, inside and outside the organization is strongly needed.

The design of the new data model will be based on some general criteria:

- **Rationalization**, where possible, of the data sources;
- **Compliance with nomenclature standards** and classification of conceptual frameworks;
- Accessibility of the conceptual frameworks according to the defined privacy rules;
- **Definition, for each entity of the conceptual framework**, of a reference "owner" user within the Administration, even using an aggregation by "views";
- **Presentation of the terminology** used in a business glossary;
- **Identification of redundancies** and resolution of related anomalies;
- Definition of **Data Enrichment** policies:
  - Recognition of the requirements expressed by the stakeholders and by the service model;
  - Analysis of the data availability and identification of sources able to enrich the information assets;

- Definition of cooperation methods with data owners;
- Data acquisition;
- Information Processing.

The design phase of the new high-level data model assumes the definition of some further criteria:

- Entities and relationships to be integrated into the knowledge base;
- Integrity or business rule constraints required to meet information needs.

The new Data Model will take into account the information needs connected with the forecasted increase in flows and functions to carry out.

The evolutions concern specific functional areas in which the Entities and Relationships that must flow into the new Enterprise Data Model should be identified:

- Evolution of the Open data section of the portal according to the LOD (Linked Open Data) paradigm;
- Management of unstructured data (Data Enrichment);
- Evolution of the offer.

The evolution towards the publication of four or five stars Open Data (i.e. respectively, shared through URI or in Linked Open Data format, according to the 5-star classification model) may not generate impacts itself, if compared to the current situation.

## 5. MIGRATION PLANNING

The migration plan takes into account the implementation needs deriving from the target service model adopted and the Cloudify NoiPA target architecture implementation constraints.

It takes as well into account the data migration needs related to the service roll-out for both prospects and currently served administrations.

In order to define the best action plan, alternative options were set and the "best fit" was identified:

- Support to the program strategic objectives;
- Containment of the operational impacts on the user structures;
- Technological feasibility.

The migration must take into account the implementation needs and the implementation constraints/sequences, considering furthermore, the minimum operational impact on the user classes served as a key driver for the services activation. Given these aspects, different migration possibilities and different detailed scenarios were structured.

The possibility to activate partial service model options for the users providing for the simultaneous use of the Cloudify NoiPA service with the legacy service has been excluded.

One of the migration possibilities provides for functional modules releases and may involve the services coexistence on Cloudify NoiPA and transitory access to the legacy system, until the release of the specific service on the new system. The adoption of such a model would involve extra implementations for the legacy system integration in the new model, in order to preserve the service access homogeneity and the containment of the impacts on the user.

During the program implementation phase, a comparative scenario analysis will then be carried out following three macro-drivers:

- Support to the Directorate strategic objectives;
- Feasibility, synergies and technological impacts;
- Impacts on the operating model.

# 6. IMPLEMENTATION GOVERNANCE

Cloudify NoiPA is a digital transformation program, whose manager is the Head of the Information Systems and Innovation Directorate, assisted by the directorate's executives. The program manager coordinates the program governance functions:

- Program Management Office, dealing with the program governance;
- Communication, dealing with Cloudify NoiPA communication activities;
- Project technical secretariat, whose objective is the administrative management of the program in accordance to the rules dictated by the Territorial Cohesion Agency for the beneficiaries of PON and the related PAC funds;
- Chief Technology Officer, whose goal is the architectural integrity of the NoiPA Cloudify platform during its entire life cycle;
- Project streams dealing with: Service Model, Software Development, Infrastructure, Data Governance.

The program complexity requires a dedicated organization and governance ensuring the objectives achievement and the compliance with the established timescales, through:

1. Project activities plans supervision;
2. Project results achievement verification;
3. Control of the sustainability of schedules, commitments and costs of the program;
4. Continuous and structured monitoring of risks and of possible variations of the project activities.

# 7. ARCHITECTURE CHANGE MANAGEMENT

## 7.1 MIGRATION AND PUBLIC BODIES ACQUISITION CHANGE MANAGEMENT

The Change Management activities and the related outputs are correlated with the software life cycle. The timescales will be defined in a later planning phase and only after the effective consolidation of the migration plan.
The main points of attention of the Change Management activities defined for the Migration can be summarized as follows:

1. Internal training on: services catalog and characteristics, data and migration modalities and application.
2. Internal communication: to be aligned with the main program phases and deadlines.
3. Demand: activities to be carried out to support the new public bodies in joining the service and the DSII working groups dealing with the data migration.
4. External training on: Key User and application.
5. External communication: to be aligned with the main program phases and deadlines.
6. Assistance and support after the start-up phase.

## 7.2 PROGRAM WEBSITE

Among the tools supporting the communication, training and collaboration, the project website will play a central role. Characterized by a public and a private component and equipped with *collaboration* tools allowing the execution of the program activities together and directly on the platform, such solution will permit to communicate to citizens, administrations, users and stakeholders, the program expected results and the methods in which the public resources are being used, in an effective and transparent manner.

## 7.3 THE CULTURAL CHANGE WITHIN THE DSII

The increase in the number of users to be managed, the creation of new services, the adoption of the cloud technology, the use of the execution methodology (DevOps), are the main challenges that the DSII will face in the Cloudify NoiPA program. The Directorate will have to use management levers including:

- The ability to redesign new processes / work methods;
- The development of human resources skills;
- The ability to build a common vision;
- The ability to remove the behavioral and cultural barriers existing in the organization.

The change path will begin with the identification and sharing of the vision.

To this end, the Change Management plan will include a series of actions aimed at:

- Redesigning the organization through the redefinition of roles and responsibilities;
- Designing new services through a "user centric" approach;
- Re-engineering the internal work processes;
- Preparing the human resources to operate using new methods;
- Developing the new professional and technical-operational skills required;
- Monitoring the working environment and changes informing the involved personnel about the expected changes.

The path, involving all the actors, will be divided into three steps: awareness, acceptance and adoption. All the initiatives will be implemented and linked in a comprehensive and integrated manner within the vision, which will "keep together" the results and give consistency to the outcomes produced in terms of organizational and cultural change.