Sodalite

Layer-based business models for HPC and Multicloud optimisation

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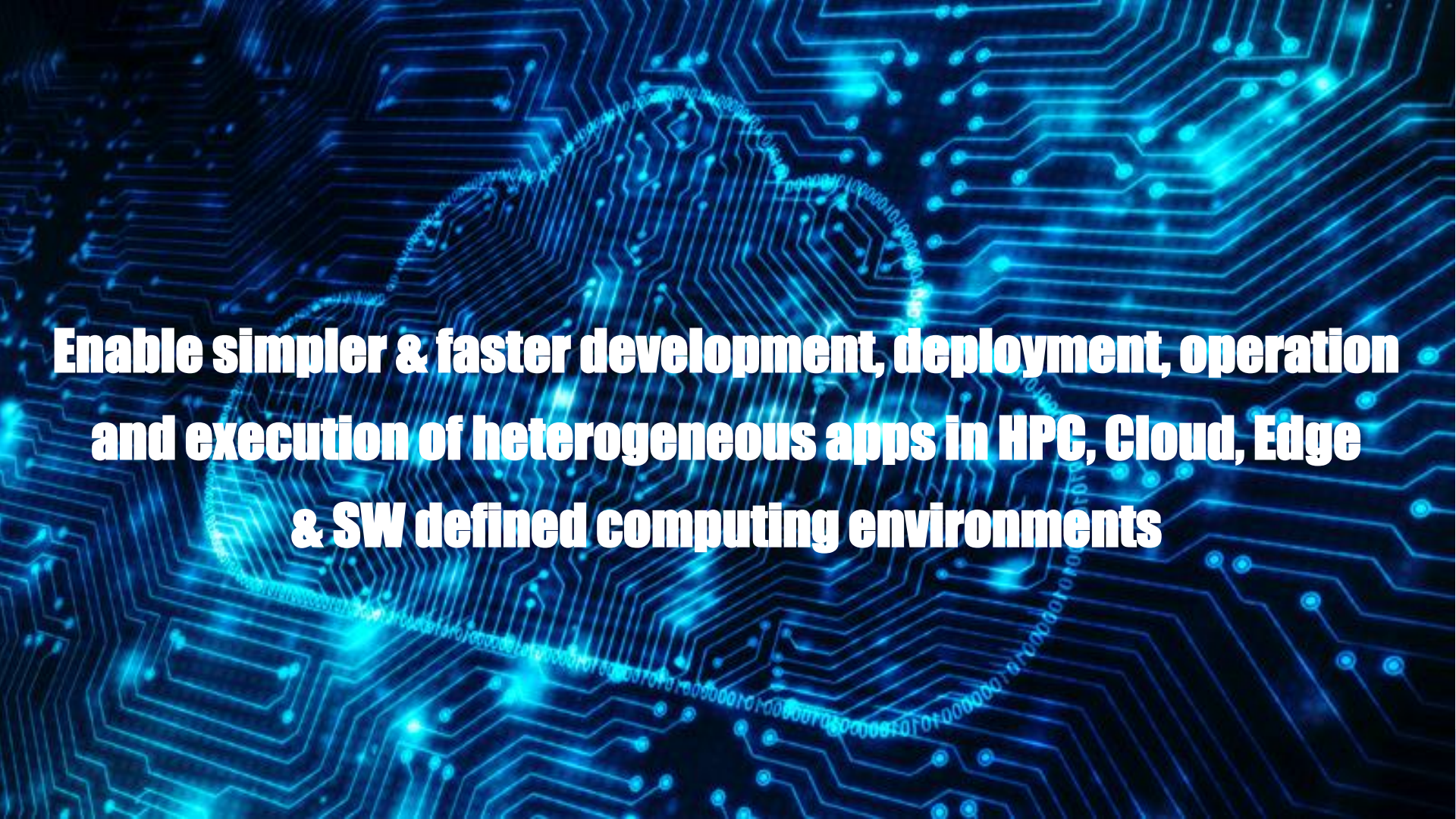
9.12.2021

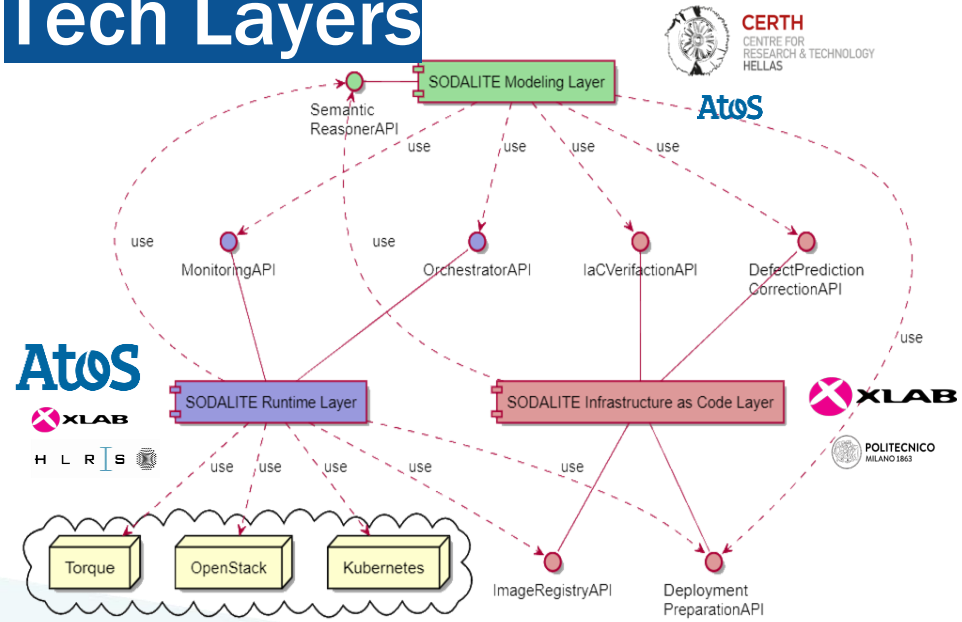
SODALITE Final Event

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 825480.


Enable simpler & faster development, deployment, operation and execution of heterogeneous apps in HPC, Cloud, Edge & SW defined computing environments

Innovation

Tech Layers



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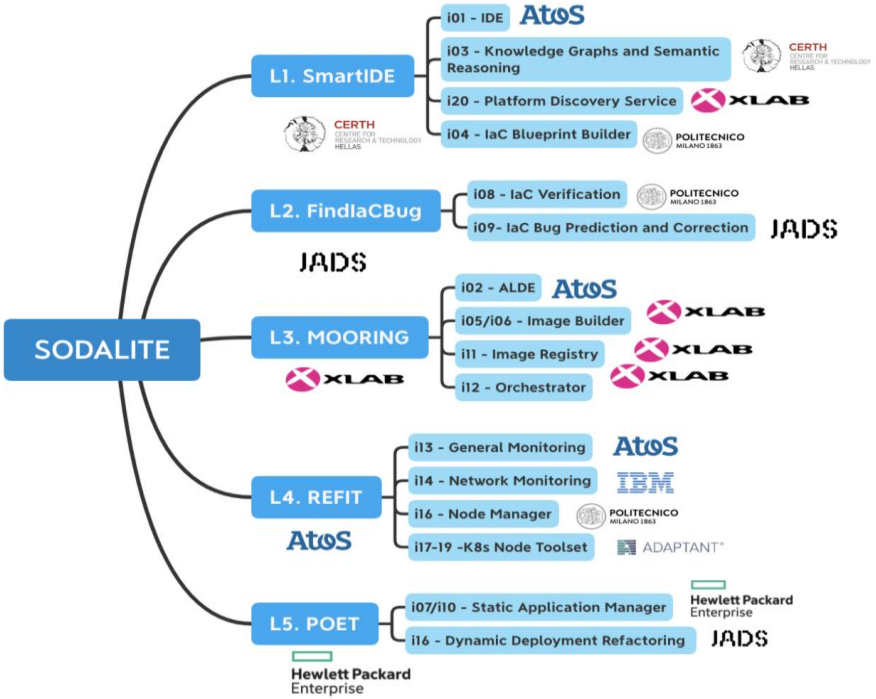

Innovation Stacks

SODALITE Full-stack Solution

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Problem handle the growing complexity of infrastructure mgmt. and application deployment making the process replicable

Solution A toolset to abstract application and infrastructure requirements to enable simpler and faster development, deployment, operation, and execution of heterogeneous applications in Cloud/Edge/HPC

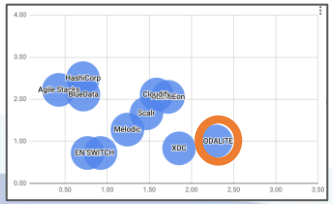
Differentiator applicability to heterogeneous, software-defined, high-performance, cloud infrastructures, with focus on performance, quality, manageability, and reliability

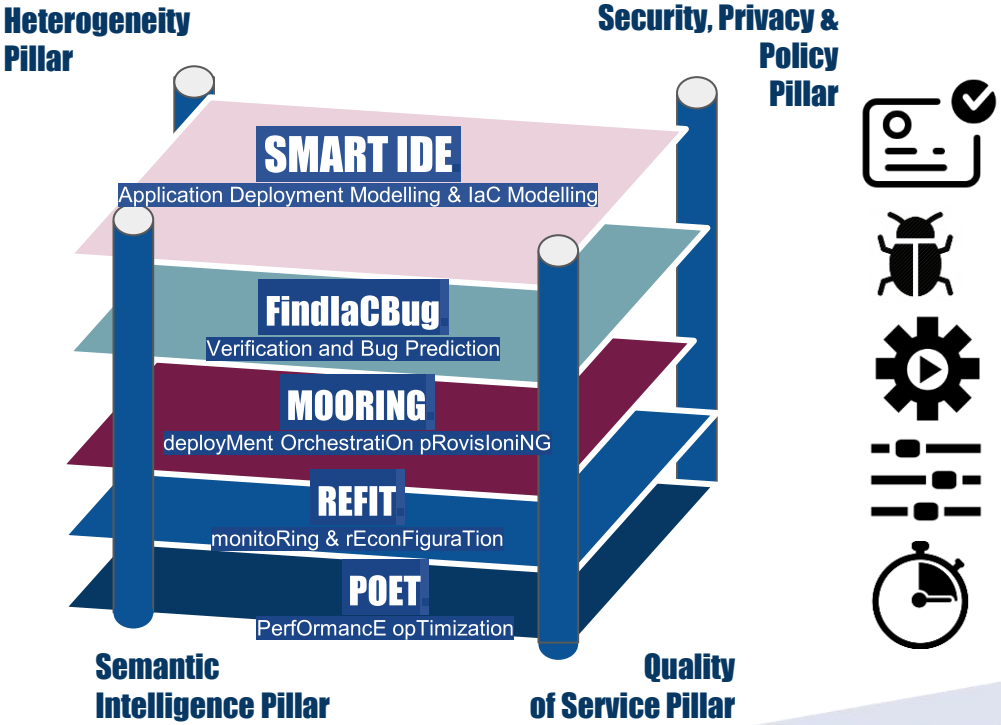
Opportunity the increasing need of IaC tools to support DevOps and to ease the need for specific expertise

Innovation AADMs, platform discovery, HPC orchestration, ML-based IaC verification, reconfiguration, static optimisation

Competitors

- ❑ Hashicorp
- ❑ Bluedata
- ❑ AgileStacks
- ❑ Cloudify
- ❑ ActiveEon





SODALITE Stack 1: Smart IDE

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Problem Complex deployment model on heterogeneous infrastructures (too many considerations to be taken into account) without further assistance based on previous experiences

Solution DSL editor to develop a complex application deployment model, Reasoner to provide recommendations/validations, TOSCA application deployment model

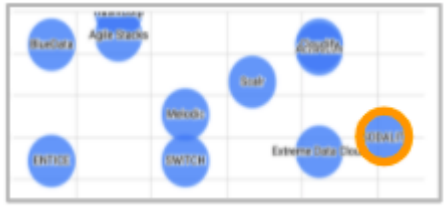
Differentiator intellisense integrated process to develop complex deployment schemas taking into account different considerations such as performance and security

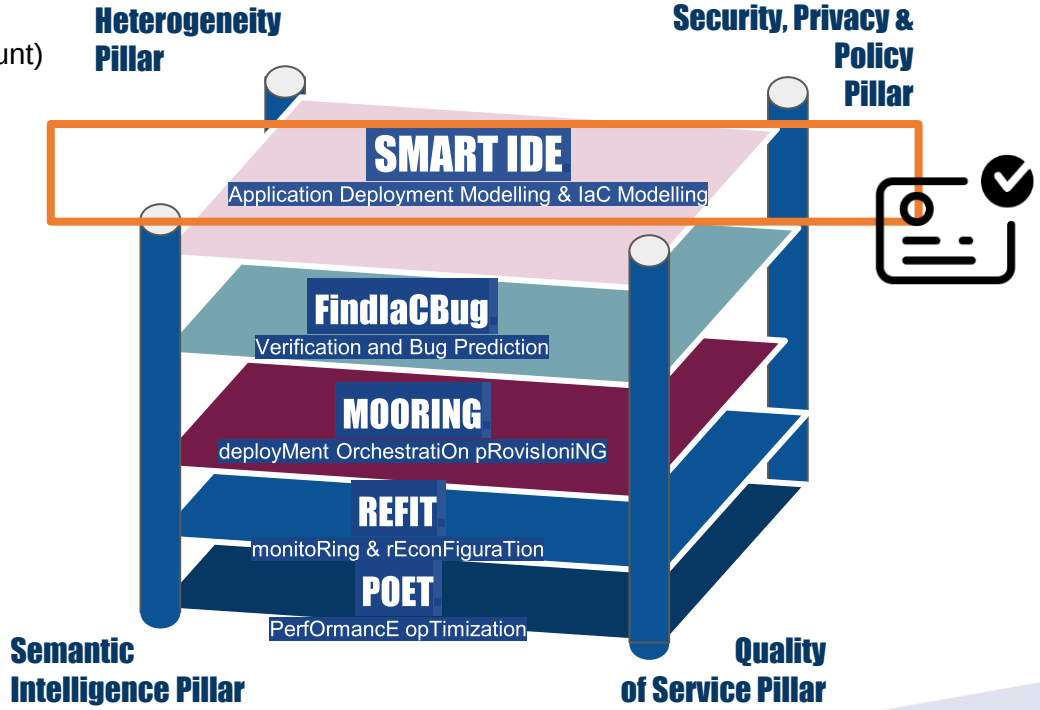
Opportunity Growing need for complex deployment on heterogeneous infrastructures

Innovation Semantic reasoning and context-aware content assistance, Cloud and HPC TOSCA-compliant

Competitors

- ❏ Alien4Cloud
- ❏ Cloudify
- ❏ DICER
- ❏ SWITCH
- ❏ XDC





SODALITE Stack 2: FindIaCBug

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Problem to build high-quality IaC artifacts, the users need to follow the recommended best practices of developing IaC scripts, and avoid applying the bad practices. Still, they can inadvertently introduce errors, smells and bugs to the IaC code

Solution the users need a tool that can help them to easily and interactively check the quality of the IaC code they develop, and to get recommendations on how to fix any detected quality issue

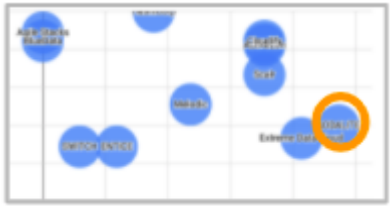
Differentiator The ability to develop high-quality defect-free error-free IaC codes

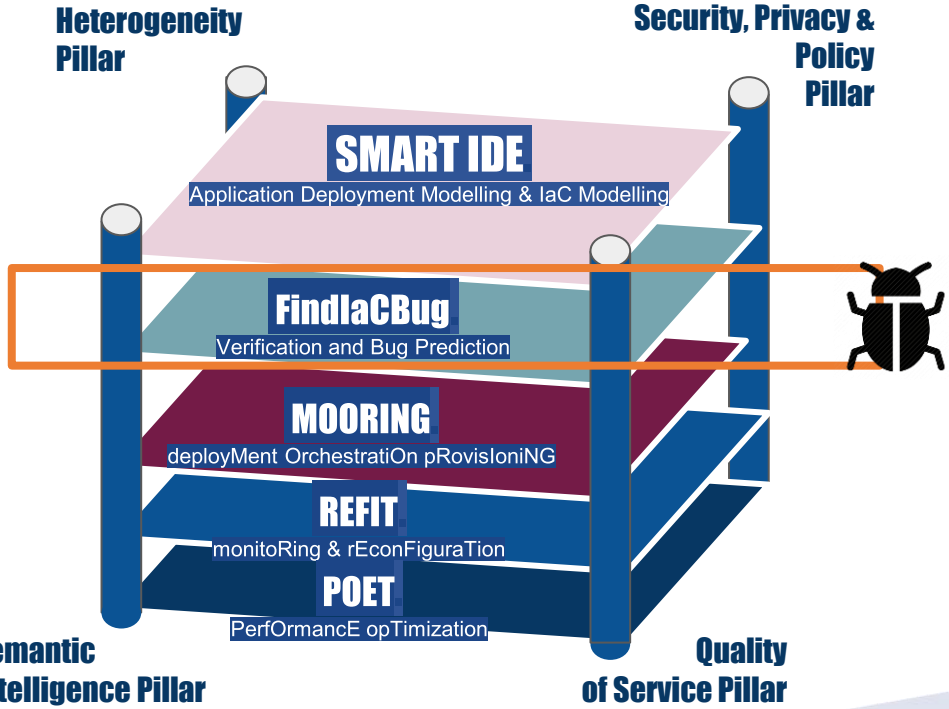
Opportunity need to improve IaC code quality interactively with recommendations on how to fix any detected issue

Innovation Data-driven prediction of IaC defects and smell detection in IaC

Competitors

- ❏ Scalr
- ❏ Ansible-Lint
- ❏ Puppet-Lint
- ❏ ActiveEon
- ❏ XDC





SODALITE Stack 3: MOORING

Problem Difficulty of manual deployments, lack of TOSCA compliance for deployment of complex application on heterogeneous infrastructure including HPC, cloud, edge

Solution Providing TOSCA-compliant means to the automation of the provisioning, deployment and orchestration of applications on target infrastructure

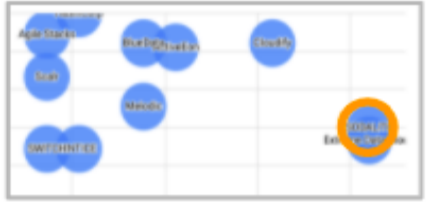
Differentiator Offering of IaC, choice between various HPC, private/public Cloud and Edge environments and the appropriate scalability of HPC applications

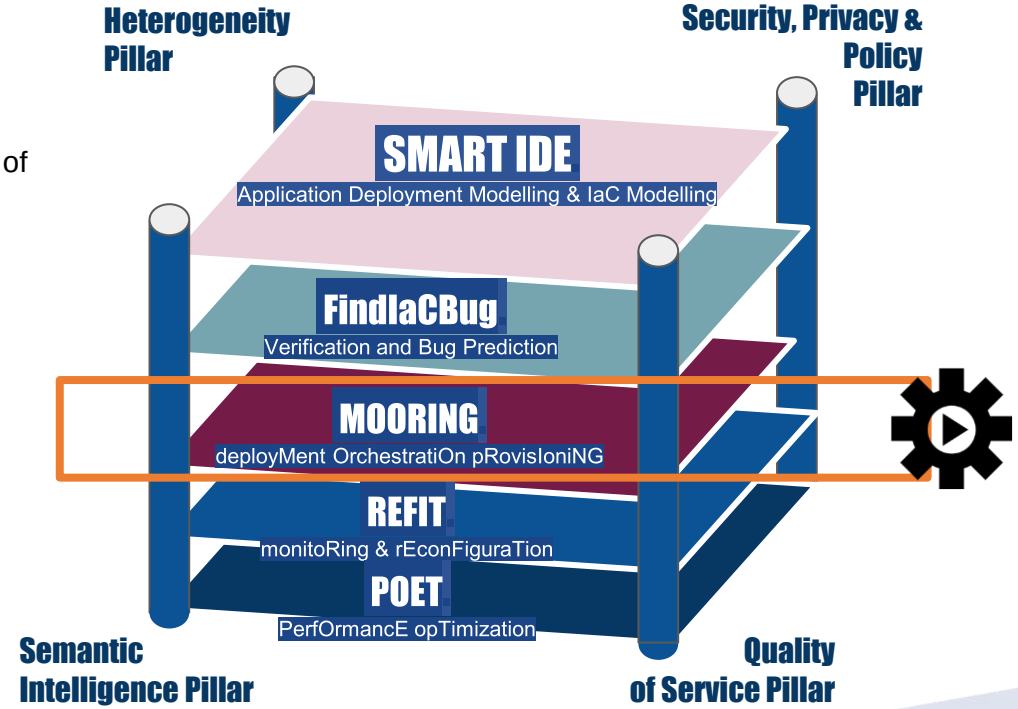
Opportunity Challenges of infrastructure automation with complex nature, offering various HPC environments and scalability of HPC applic

Innovation heterogeneity of building process using IaC & TOSCA with orchestration for runtime images

Competitors

- Hashicorp
- Cloudify
- Alien4Cloud
- Indigo DataCloud
- Yorc Orchestrator





SODALITE Stack 4: REFIT

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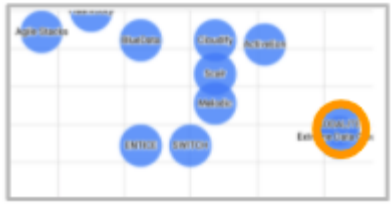
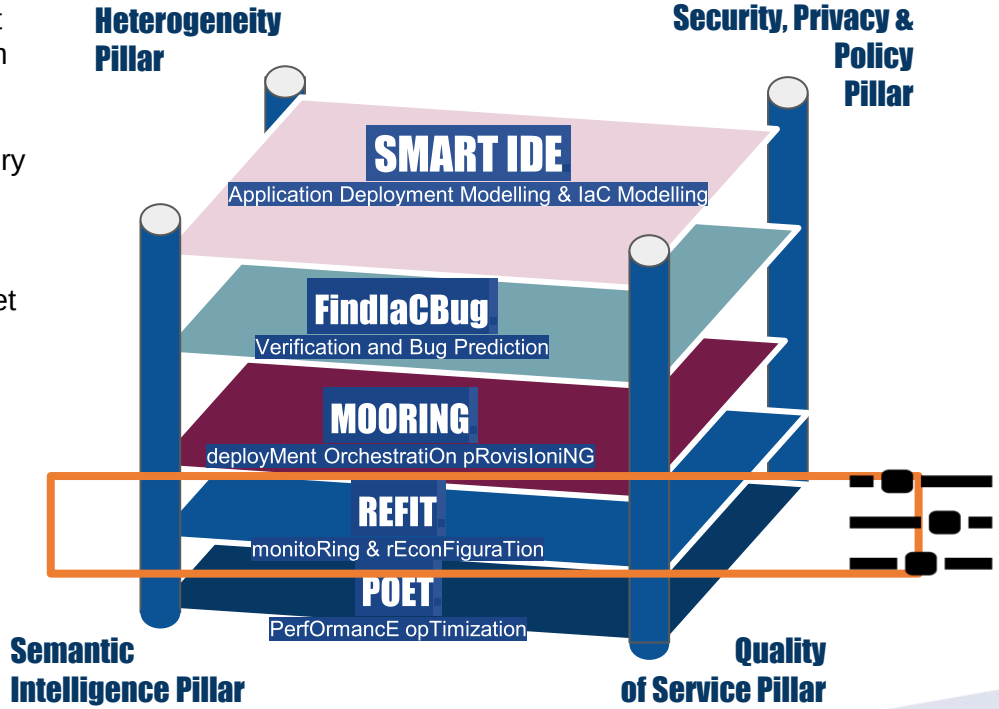
Problem monitoring data management coming from different source and pinpoint the application that is causing the problem
Solution monitoring technology that collects, stores and aggregates data to simplify the access to it.
Differentiator dynamic monitoring, runtime resource discovery and autonomous refactoring of application deployments will change the way we manage heterogeneous (multi-cloud and HPC) environments.
Opportunity need for accurate selection of an appropriate set of deployment options for a given context
Innovation monitoring information to re-deploy applications and manage node resources

Competitors

- ❑ ActiveEon
- ❑ AWS Autoscaling
- ❑ Extreme Data Cloud
- ❑ AWS Feedbackloop
- ❑ DataDog





SODALITE Stack 5: POET

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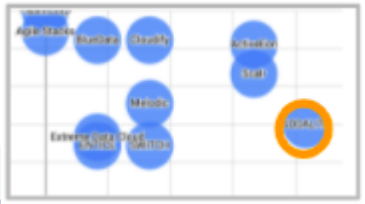
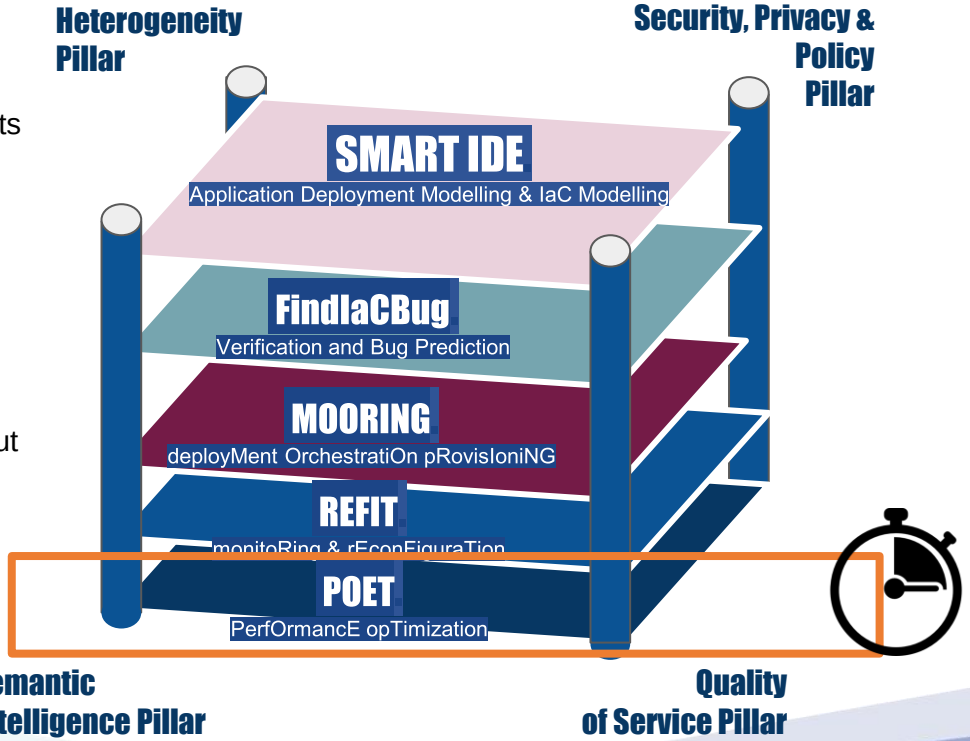
Problem application experts have limited hardware or optimisation knowledge to use diverse targets in an optimal way
Solution software-defined infrastructure, automating the optimisation of application deployments for heterogeneous targets
Differentiator automating optimisation of application in HPC domain for an IaC environment; refactoring applications for performance in HPC environment.
Opportunity there is no solution in the market that is able to appropriately address static application deployment in the HPC domain and for heterogeneous targets.
Innovation allowing to cater for additional knowledge, profiling data or autotuning, without exhaustive study of applications; minimal and novel approach that can be used by an expert without having to undertake exhaustive study of applications

Competitors

- HPE Ezmeral
- melodic.cloud
- ActiveEon
- Scalr
- AWS Compute Optimizer





Modularity & Integration

Modularity	Compatibility
AADM modelling	TOSCA/CSAR
Optional component	No Dependencies
Reusable by design	TOSCA orchestrator
Standalone component	Optional but prefered
Optional component	No Dependencies

Sodalite

aws

* AWS Marketplace
(Public Cloud Package)

openstack.

* Openstack Marketplace

kubernetes

* K8s Operator will install SODALITE into K8s directly (installer inside cluster)

slurm
workload manager

* optimized image for HPC workload

TORQUE
RESOURCE
MANAGER

* optimized image for HPC workload

GAIA-X

* Applications on Demand Marketplace

EGI

* Applications on Demand Marketplace

EUROPEAN OPEN SCIENCE CLOUD

* Applications on Demand Marketplace

Business & Pricing Model

Sodalite

	Trial	Basic	High-End
	Testbed Access	Light SODALITE	Advanced SODALITE
	FREE	€	€€
Optimisation & Reconfiguration	✓	✓	✓
Own Infrastructure Access	x	✓	✓
Configuration	✓	✓	✓
Maintenance	x	€	✓
Support & Training	x	€	✓
Customisation	x	€	✓
		Premium Services €	

Individual/Joint Exploitation & Business Opportunities

Sodalite

XLAB

leading MOORING, opportunity with RedHat

Atos

leading REFIT, exploring opp within ATOS solutions and further ALDE development

POLITECNICO MILANO 1863

SNOW extended to new opportunities, further research

ADAPTANT

exploring opportunities through KnowGo

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

leading SmartIDE with ATOS, further research

IBM

exploring opportunities with RedHat on OSS

Hewlett Packard Enterprise

leading POET, exploring opp. within HPE

JADS

leading FindIaCBug, further research

SNOW > Green Deal (AI infrastructure/application management improvement)

In-silico C.Trials > Healthcare 4.0 (heterogeneity support & deployment reconfiguration for personalised medicine)

IoT automotive > connected transports and fleets (System multi-user (individual) and cross-border or anonymous passenger (fleet))

Get To Know SODALITE

Sodalite

We need
- Collaboration
- Fellowship to advance my/our research

3 contributors

Sectors
- Business and industry

Result Maturity
5 - Demonstration - System Development (TRL 6-8)

We have
✔ IPR ✔ Market study

SUSTAINABLE DEVELOPMENT GOALS

HPCwire

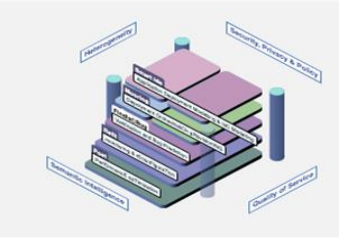
Since 1987 - Covering the Fastest Computers in the World and the People Who Run Them

- Home
- Technologies
- Sectors
- AI/ML/DL
- Exascale
- Specials
- Resource Library
- **Podcast**
- Events
- Job Bank
- About
- Solution Channels

May 29, 2020

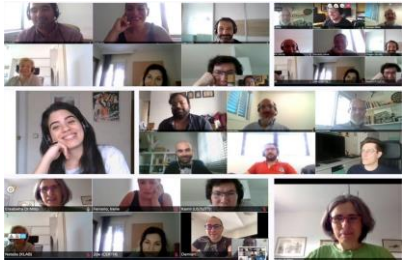
Developing and deploying applications across heterogeneous infrastructures like HPC or Cloud with diverse hardware is a complex problem. Enabling developers to describe the application deployment and optimising runtime performance while protecting data privacy and security is paramount. SODALITE, a Horizon 2020 project, aims to solve this by providing tools for increasing design and runtime effectiveness of software-defined infrastructures.

SODALITE targets complex applications and workflows that are deployed on heterogeneous environments such as virtual machines, containerized HPC clusters, Cloud and Edge devices. In this context, deploying the application in



HiPEAC

ISC High Performance



SODALITE use case domains

Immediate impact

SODALITE is achieving impact across a diverse range of use cases. In the health context, it is being used to improve performance of in-silico clinical trials. With regards to climate change, it is being used to leverage GPU and HPC resources to more effectively monitor snow levels in mountain ranges. In the automotive context, SODALITE enables adaptive application and deployment reconfiguration of connected vehicle services, leveraging heterogeneous compute resources in cloud/edge environments for more power- and cost-effective computation and processing of IoT and vehicular sensor data.

Showcasing sodalite advancements in COVID-19 times

SODALITE innovates not only technologically, but also in terms of impact and communication. During the first lockdown period, coinciding with the biggest HPC event in Europe, ISC HPC 2020, a new method of exhibition was needed to engage with virtual attendees. SODALITE developed a virtual booth, including a live chat, interactive games, and registration for follow-up events, such as webinars. See the project website for more.

NAME: SODALITE : SOftware Defined Application Infrastructures managemenT and Engineering
START / END DATE: 01/02/2019 - 31/01/2022
KEY THEMES: digital transformation, heterogeneity, HPC, cloud, application software
PARTNERS: XLAB (Slovenia), High Performance Computer Center University of Stuttgart- HLRS (Germany), ATOS (Spain), Politecnico di Milano (Italy), ADAPTANT Solutions (Germany), CRAY HPE (Switzerland and U.K), IBM (Israel), ITI-CERTH Information Technology Center (Greece), Jheronimus Academy Data Science (Netherlands).
BUDGET: €4.99M

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 825480.

SODALITE team members in Milano General Assembly

www.sodalite.eu/sodalite-full-stack


DO SOMETHING GREAT

Sodalite

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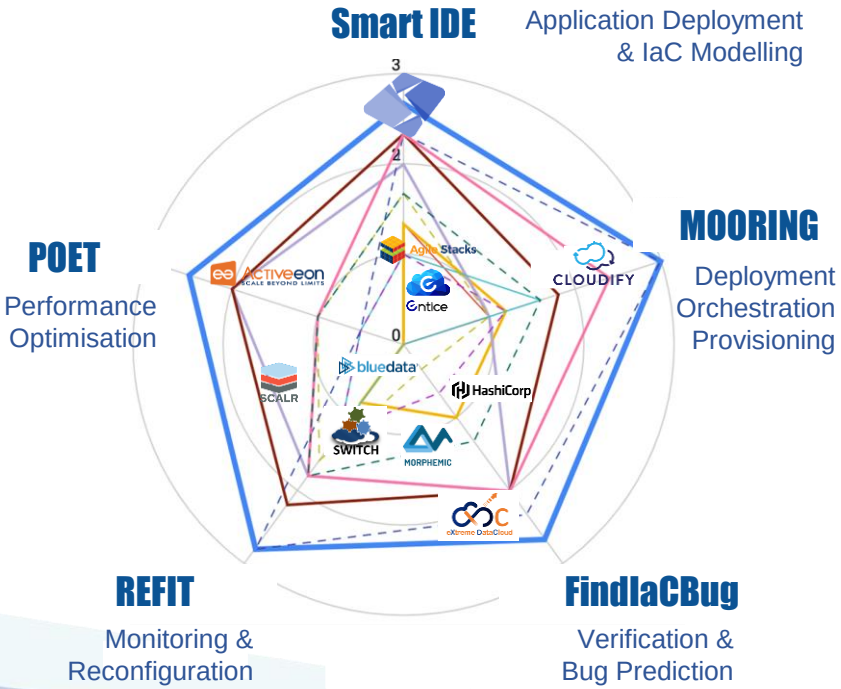
SODALITE Users & Alternatives

Sodalite



Role	Organizational Roles	User Stories
Application Ops Experts (AOE)	Application Developer, SRE, DevOps	deploy software components and model processing pipelines; orchestrate several components; add several components, schedule their execution and organize their intermediate data handling,
Resource Experts (RE)	Application Developer, SRE	continues deployment cycles to improve and add new features to the deployed components; monitor the performance of the several components of the application
Quality Experts (QE)	Application Engineer, Lawyer / CIO / CISO, Environmental Specialist, SRE, Application User	enable/disable certain modules to meet some data treatment constraints; verify compliance with the requirements; ensure that not only the application is available, but that it is running reliably

Service Limitations

Sodalite

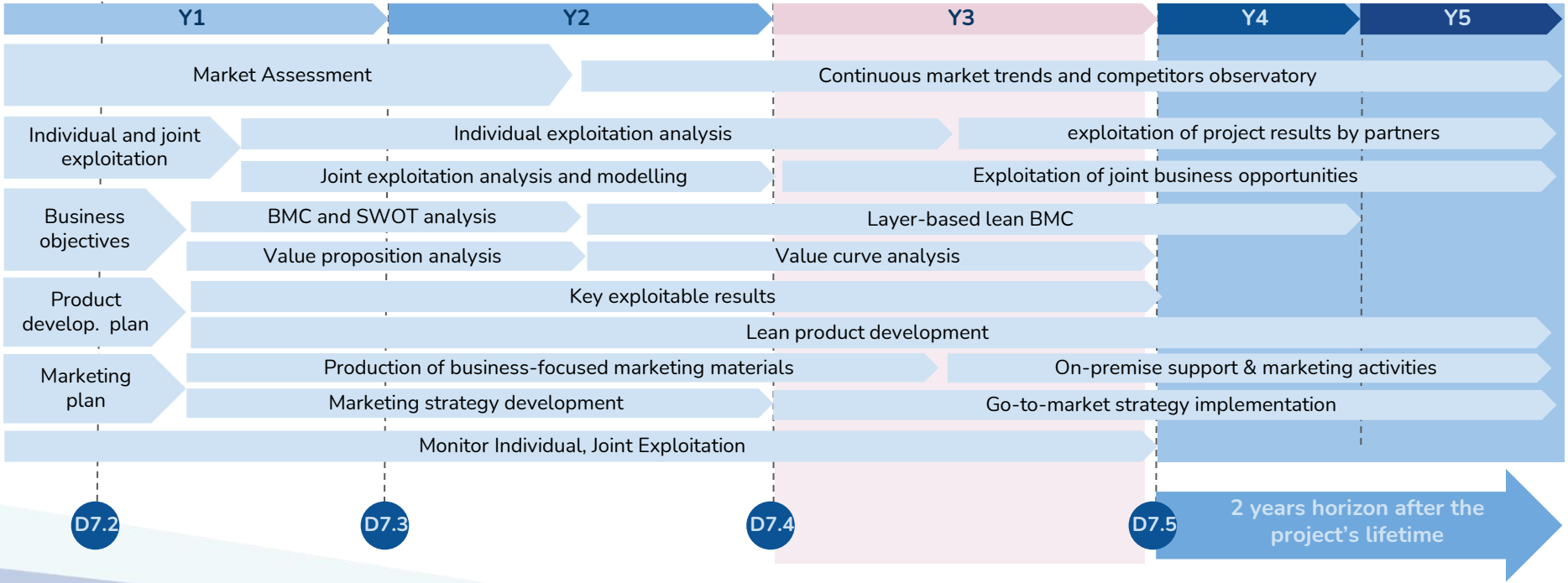
Plan	OSS Stack	Light SaaS	Full SaaS	Enterprise
	Apache 2.0 license with current features	*SaaS monthly/annual license with limited features*	*SaaS monthly/annual license full-featured*	*Optimized for on-premise installation*
Pricing	Free Considering that the user downloads the software from the SODALITE repositories	Basic Including costs of cloud usage and maintenance, basic (email) support, etc	Mid Including costs of cloud usage and maintenance, support, and advanced features	High Including customization per request, premium support, and advanced features
Features	SODALITE Core Including the software of the most current OSS release	SODALITE Core Including all the stable software with described limitations	SODALITE Core+ Including all the stable software without usage limitations	SODALITE Core+ Including all the software without usage limitations
Add-ons	None All support, training and consultancy are paid per request or available as OSS Community online forum	Basic Basic online support, all training and consultancy are paid per request	Full Premium support, all training and consultancy available, configurations and customizations available per request	Full Premium support, all training and consultancy available, configurations and customizations included in the pricing tier

Functionality Limitations

Sodalite

	 **OSS Stack**	 **Light SaaS License**	 **Full SaaS License**	 **Enterprise Version**
	Full functionality w/ own configuration	*Limited users, features and functionality*	*Unlimited users, features w/ full functionality*	*Full functionality with support for config. & integration w/ existing tools*
L1. Smart IDE	deployment patterns based on **preexisting models**	**basic** functionality w/ **limited** AADMs and IDE features	**full** functionality w/ **unlimited** AADMs and IDE features	**support on deployment, configuration, and integration** with existing tools
L2. MOORING	deployment-orchestration-provisioning w/ **unlimited** deployments /roles	limit the deployments to **micro instances and user roles**	**Fully f**eat. workflow scheduling/ optimisation of working time	deployment-orchestration-provisioning w/ **integration with existing solutions** at user side
L3. FindIaCBug	**subset** of smells, anti-patterns, bugs and security & privacy vulnerabilities in IaC scripts	**subset** of smells, anti-patterns, bugs and security & privacy vulnerabilities in IaC scripts	**full support** of smells, bugs and security & privacy vulnerabilities in IaC scripts	find & fix **custom and application-specific** smells, anti-patterns, bugs and security & privacy vulnerabilities in IaC scripts
L4. REFIT	monitor a **subset o**f metrics, basic support for find&fix performance anti-patterns	monitoring of a **subset** of metrics and basic event-based deployment refactoring	monitor of **widely used metrics**, ML support, find&fix performance anti patterns, **usage reports**	monitoring of **custom** application/ infrastructure-specific metrics, full support and custom **usage reports**
L5. POET	**basic** support for AI frameworks and **traditional** HPC, modelling performance and batch sch.	**basic** AI and **traditional** HPC support, modelling performance and batch sch	**advanced** support with automated tuning of performance, support for **HPC in public cloud**	**advanced** support with automated tuning of performance, support for **HPC in public cloud**

Timeline


Y1
Y2
Y3
Y4
Y5
Market Assessment
Continuous market trends and competitors observatory
Individual and joint exploitation
Individual exploitation analysis
exploitation of project results by partners
Joint exploitation analysis and modelling
Exploitation of joint business opportunities
Business objectives
BMC and SWOT analysis
Layer-based lean BMC
Value proposition analysis
Value curve analysis
Product develop. plan
Key exploitable results
Lean product development
Marketing plan
Production of business-focused marketing materials
On-premise support & marketing activities
Marketing strategy development
Go-to-market strategy implementation
Monitor Individual, Joint Exploitation
D7.2
D7.3
D7.4
D7.5
2 years horizon after the project's lifetime