Lessons Learned in Architecting GMOSAIC Security Services

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ABSTRACT

This document presents lessons learned in 3-years architecting project called GMOSAIC: "GMES Management of Operations, Situation Awareness and Intelligence for regional Crises".

G-MOSAIC aimed to demonstrate the provision of geospatial data services to support EU external relation policies. One major contribution is the provision of better mapping services as a useful resource for acquiring and updating relevant geo-information. Another objective is ensuring better inputs for planning operations. Architecture alternatives were evaluated & compared using technology forecasts and pre-cited economic data. NAF V3.0 [3] was used to capture, audit and elaborate alternative provision views for expected services, using COTS for architecting, evaluation and comparison.

The paper and presentation includes a selection of analyses files of representative of GMOSAIC key service chains. As a perspective for Security service governance, if the funding model were built to simulate "what-if" conditions on customer classes, their subscription type(s), the corresponding levels of Quality of Service (QoS), and fees per level of requested QoS, then the provided analyses files might have be used to extend the selection of alternate building blocks based on customer classes and fees. Some alternate solutions would then then apply to some classes of customer not all, thus improving eligibility scores of a higher number of building blocks. To conclude, the paper lists the barriers (commercial, cultural, technical) that hinder the capture of inputs for such models.

Lessons learned from this three-years architecture development work may provide hints for:

- *Improvement in NAF definition and implementation,*
- *Requirements for affordable architecture evaluation tools.*
- *Guidelines for organisation of architecture &evaluation works with solution & service stakeholders.*

Key words: *architecture, capability, service, enterprise, regional crises, users, sustainability.*

INTRODUCTION

GMOSAIC Stakeholders included European geospatial data providers and more than fifty Defence & Security Key Users, collaborating with the project team through twelve Reference Operational Scenarios. Key users were representatives of industry, public and private end-users, research establishments, as well as non-governmental organisations and EU bodies.

The main purpose of Architecture activity was to provide operational, system and technical architectures which deliver sustainable security services. A selection of architecture views were developed to satisfy collected security capability requirements and adapt to their evolution at short, mid and long term. The architecture study aimed to support the governance of service implementation at GMES level. Starting from the GMES enterprise vision, the architecture team structured the identified operational needs and elaborated alternatives to operational service provision, using sustainability as a key factor for evaluation of architecture roadmaps. Analyses relied on roadmaps and economic parameters pertaining to service providers.

LESSONS LEARNED

High level vision and related projects

Starting from GMES vision [1], the GMOSAIC [2] security service architecture has been elaborated and developed along 3 years, to explore then evaluate stakeholders' contribution to sustainable security services. The vision was discussed and updated along two yearly "Users workshops", putting together more than 50 representatives of Defence and Civilian international bodies, including Europe, Africa and South America. A high level vision of GMOSAIC is provided in Figure 1.

The GMOSAIC Vision

G-MOSAIC project aims to provision geospatial data services finalized to support EU external relation policies. One major contribution to improving the current security situation is the provision of better mapping services as a useful resource for acquiring and updating relevant geo-information. Another objective is ensuring that the right information gets to the right people at the right time. This is crucial for planning our operations.

The GMOSAIC focuses on these objectives. GMOSAIC aims to guarantee a sustainable and operational service with a view to improve security situation awareness and to support crisis management operations.

Four capability goals are refined from this vision.

Capability Goal 1	Support intelligence and early warning with the objective to contribute to the analysis of the causes leading to regional crises
Capability Goal 2	Support Crisis Management Operations, with the objective to contribute to support the planning for EU intervention during crises
Capability Goal 3	Support Crisis Management Operations, with the objective to contribute to support the planning for EU intervention and citizen repatriation during crises
Capability Goal 4	Support Crisis Management Operations, with the objective to contribute to support EU in the crisis consequences management reconstruction & resilience

Figure 1. Synthesis of GMOSAIC's Vision

Goals and their dependencies were analyzed through twelve Operational Scenarios agreed with the USERS Group, that helped to understand the key parts of capability taxonomy in which architecting efforts and preoperational services were expected by the EC and the Users. Two major events impacted the vision and forced the actors to refine the scope of the project:

- The first review of the scoping and reference scenarios with the end users revealed possible interleaving with another security related key project (sharing some key stakeholders). Additional workshops were planned by project management to confirm scopes & refine objectives. Using some programmatic views tracing capabilities to projects deliverable (definition of pre-op services) would have helped the stakeholders and project manager to anticipate this issue.
- The first review of the vision and the architecture scope revealed to some stakeholders that additional contributions were expected, for the feasibility architecture to go beyond the "demonstration" phase. In particular, service providers were demonstrating the short term feasibility, and postponed the provision of products and technology roadmaps twice, for two major reasons:
    - Involved companies did not plan to deliver product roadmaps to enable governance models; they considered the architecture project as a floor to demonstrate 'as-is' products and know how, within the designed service chains.

- Enterprise policies did not ease the communication of the evolution of SLA/SLS for each pre-operational service, as many of the companies had similar products and were thus in competition to supply part or whole of the service chains.

Nevertheless, the architect team has been provisioned with some delay with partial information, updated at the second iteration of the architecture. The main triggers were the User workshops, where User representative refined reference scenarios to assess for mid-term trial, their expectations on operational and technical interoperability, as well as their actual needs for enabled user interactions with the service provision repository. Both kinds of requirements had a substantial impact sustainable service level agreements and the evolution of related service level agreement specifications (SLA/SLS).

Architecting approach and pitfall avoidance principles

Understanding operational processes and activities at each high level node was one of the key issues, to understand operational constraints and detect potential critical dependencies between expected services and underlying system resources. The Architecture team interacted with the stakeholders starting from a high level operational view of the CONOPS as depicted by **Error! Reference source not found.**.

The architecting process encompassed seven macro-activities, including iterations on the architecting models after each User Workshop to update the findings:

1. Perform operational capability gap analysis, w.r.t the first baseline of capability taxonomy,
2. Develop (or update) operational architecture,
3. Develop (or update) service architecture,
4. Develop (or update) system architecture,
5. Identify (or update) technical standard profiles and forecast.
6. Iterate (1 to 5) after the first and second demonstrations of pre-operational services, using collected users' comments.
7. Present (update) the architecture findings and recommendations to the EC & Architecture Stakeholders.

User requirements and capability gaps analyses were used to deliver a first baseline of the capability taxonomy model, depicted by Figure 2, as a reference to use during project meetings and workshops (management and technical). The rationale was to avoid confusion between "capability", "service", "building block", that we experienced along the very first interactions with stakeholders.

Initial CONOPS was delivered by the consortium, explaining the emphasis on the design and integration of candidate building blocks to service chain contribution. To understand customer and stakeholder viewpoints, the architecture team elaborated a higher level picture, highlighting the main (abstract) nodes of the CONOPS, and putting the emphasis on operational collaborations between operational data providers and consumers, and on the activities creating or using the data. Each abstract node represents a GMOSAIC thematic, each thematic considered in at least one reference operational scenario.

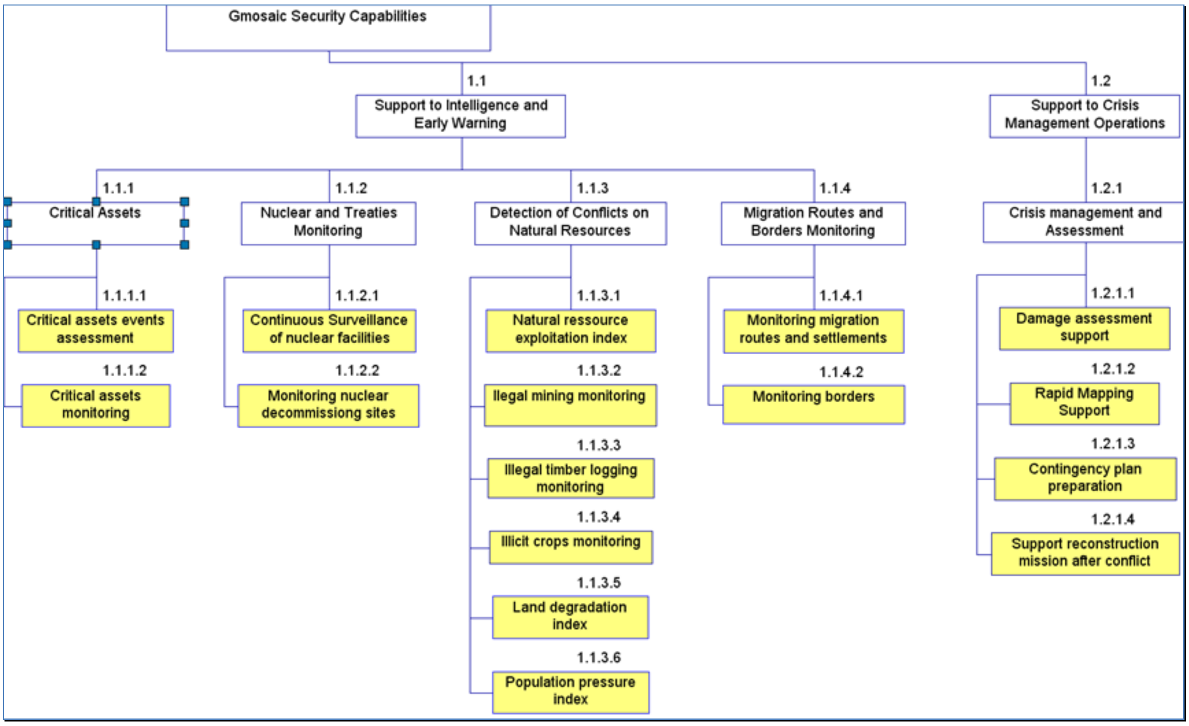

Figure 2. Capability Taxonomy

A high level NOV-2 diagram was delivered to the CONOPS owner for assessment, including refinement of abstract nodes (see **Error! Reference source not found.**) to the actual operational nodes contributing to the service chains. Then an assessed view of the nodes and needlines (NOV-3, see Figure 3) was produced, based on the assessed NOV-2 diagrams. All these Nov-2 were used to formalize the inputs and outputs of user expected “services”, seen by the design team as a chain of contributions of stakeholders, each delivering part of the service using owned building blocks and local know how.

The User node represented following users categories: GIS Centre of the Cartographic Section, United Nations Logistic Base, EUSC, Federal Ministry for European and International Affairs, GLOBAL WITNESS (UK), Délégation Générale à l’Armement (FR), Frontex, French Ministry of Defence / Etat-Major des armées (FR), and many other country representatives. Some users, such as Frontex and Global witness, were aiming at using Gmosaic service outcomes as an input to elaborate their own value-added services to similar or different end users.

Along progress meetings, we experienced some changes in building block definition and numbering, demonstrating that NOV-2, NOV-3 and NOV-5 have impacted building block owner reasoning on the target solution. However, this impacted a couple of views mapping activities to building blocks. Therefore, to increase architecture consistency, traceability between operational activities and expected services, then between services and provisioning building blocks were rapidly preferred by the project stakeholders as it provided:

- Stability to architecture descriptions, decoupling service definition from service provision alternatives, to stabilize after some technical workshops.
- Time, for building block owners to refine building block definition and roadmap, based on proposed traceability from building blocks back to expected service and concerned capabilities (demonstrated in the twelve scenarios).

Need Line	Information Exchange	Source Node	Source Owning Organization	Source Activity	Destination Node	Destination Owning Organization	Destination Activity
Border information	border map		Gmosaic Enterprise	elaborate border map	Gmosaic service provider	Gmosaic Enterprise	store gmosaic products
Contingency plan information	Contingency map	Contingency plan preparation	Gmosaic Enterprise	elaborate Contingency map			store gmosaic products
Crisis mngt information	reconstruction map	Gmosaic service provider	Gmosaic Enterprise	Publish gmosaic information	Geosupport to crisis management	EUSC	Monitor interface to GSCDA
	Contingency map						
	Damage assessment map						
	Emergency map						
Crisis mngt information support	reconstruction map	Geosupport to crisis management	EUSC	Deliver gmosaic data	User node	User organisation	Consult
	Contingency map						
	Damage assessment map						
	Emergency map						
Crisis mngt information request	request for reconstruction information	Geo support to crisis management	EUSC	Analyse user requests	User node	User organisation	Consult
Critical assets information	Critical assets map	Critical assets monitoring	Gmosaic Enterprise	elaborate critical assets map	Gmosaic service provider	Gmosaic Enterprise	store gmosaic products
Damage assessment information	Damage assessment map	Damage assessment &support to reconstruction	Gmosaic Enterprise	elaborate damage assessment map	Gmosaic service provider	Gmosaic Enterprise	store gmosaic products
Data request	Request for eo data	MM ground Segment Interface	EUSC	Monitor interface to GSCDA	GDSCA SCI	ESA	Process data requests

Figure 3. High Level NOV-3 (excerpt generalized from the CONOPS)

Capability name	Service chain outcome	Description of outcome	QoS	Service Policies
Damage assessment for post conflict situations	Damage assessment map o Base map:	• Optical satellite orthoimage • Thematic layers : o Administrative o Major cities o Road network o Infrastructure o Hydrological features	*	See SLA/SLS

Figure 4. Example of service enabling the "Damage assessment for post conflict situations"

Figure 4 introduces to the damage assessment service, an enabler of post-conflict damage assessment capability. Starting from informal description of the "service chains" mixing who, what and how, IDEF0 activity models were built for each GMOSAIC thematic, highlighting input/ output of each activity. For modularity purpose, recurrent activity models were identified and captured once in the model, then inserted where necessary in thematic activity models w.r.t the reference operational scenarios.

Figure 6 illustrates the bid activity model with focus on providers and owned building blocks. Across eight thematic activities models, the contribution of some building blocks required further analyses, as from suppliers answers to the questionnaire, it appeared that they did not use the same configuration of the building blocks in each concerned thematic.

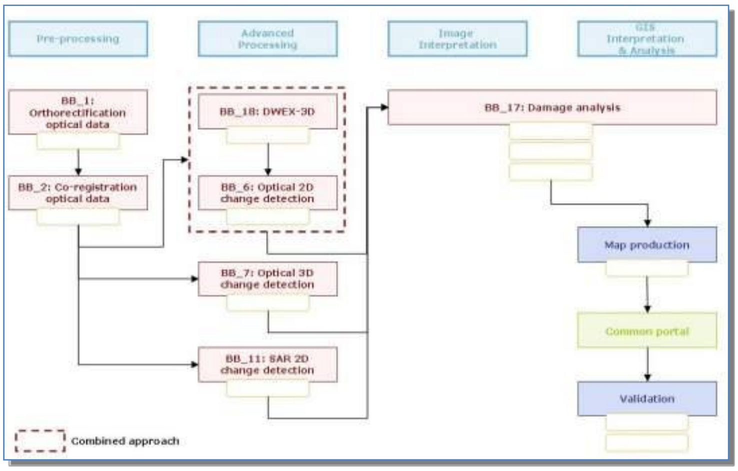

Figure 5. Initial Damage Assessment Activity model with organisations & their building blocks

To keep options consistent over time, the architecture team developed activity models for each thematic, independently from realisation details (organisations, building blocks or locations). Each activity could be realised by services provisioned in different manners, the decision being left to the project governance, to select sustainable solution, based on compared alternatives and proposed trade-offs w.r.t sustainability. Once assessed by domain experts, the architect used the thematic activity models and building blocks questionnaires filled in by building blocks owners, to propose a service taxonomy model that organizes knowledge according to the service perspective.

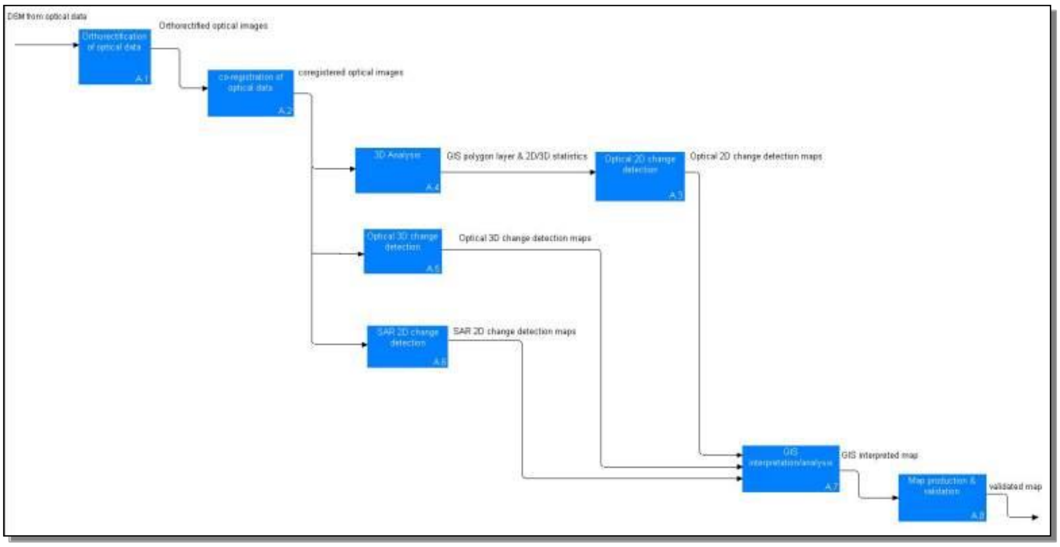

Figure 6. Damage Assessment activity model independent from organisations & building blocks

By this model (see Figure 7), the aim of the architecture team was to harmonize service provision models across reference scenarios and underlying thematic activities models, thus to perform consistent comparison of provision alternatives. Common facility services were added, to allow the users:

- Search and retrieve data from a shared repository,
- Subscribe to and interact within a community of interest on a defined topic. Interactions include the creation, modification or cancellation of thematic COI managed data.

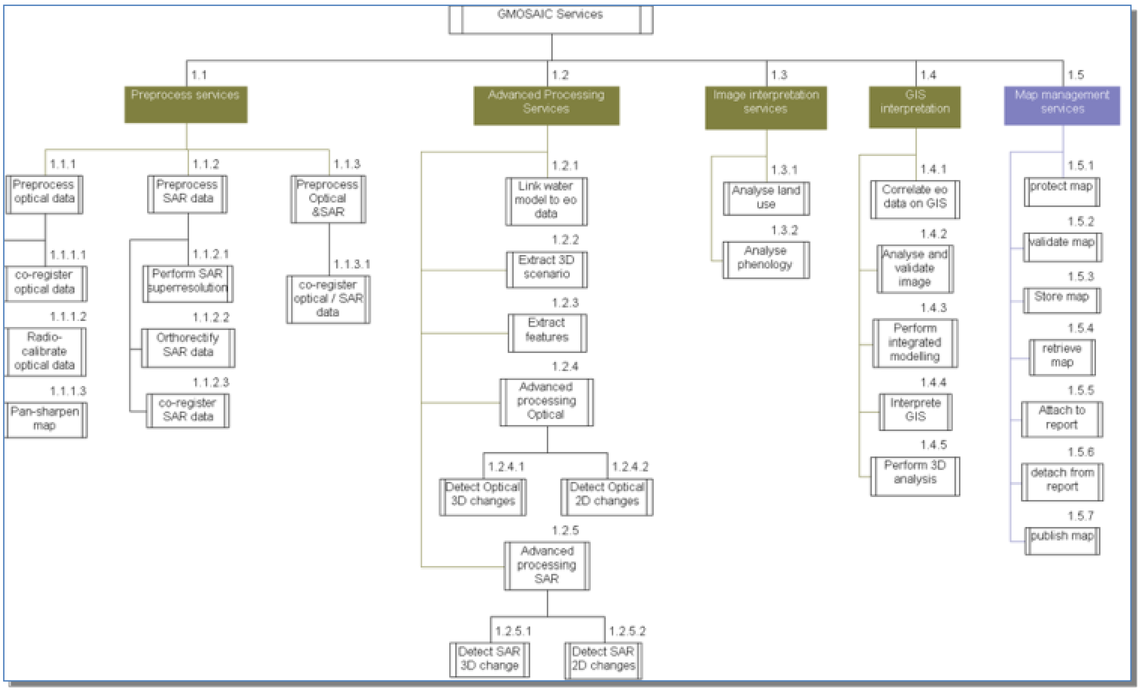

Figure 7. Initial baseline of service taxonomy model

System interfaces and evolution views

Using the system interface views (NSV-1), the architecture team identified any interface whose evolution impacted the functional outcome or the quality of service chains deliveries. By definition of service provision views, system interface of candidate building blocks were tagged as "key", unless the questionnaire showed no evolution at mid and long term perspectives. No building block showed that property, but some building blocks were ready for some mid-term expectations, with a given level of confidence.

Where building blocks provisioned different services, the questionnaire (Figure 8) expected evolution information for each concerned service.

Impacts on SLA/SLS

For rapid demonstration of pre-operational services at the first phase of the project, system building blocks were specified 'as is'. The second loop of building block questionnaire describing the evolution context of each building block, functions, quality, standards & technology included. A third loop was performed in the second phase of the project, to complete some building blocks evolution roadmaps, in cooperation with building blocks owners. The architect team communicated substantial evolutions to the SLA/SLS owners for consistency purpose across the GMOSAIC Enterprise.

Building Block Name	BB version	Provisionned Service Name	Service version	Provisionning Organisation Name	Short term Evolution (F, T, F&T)	Mid term evolution (F, T, F&T)	Long Term evolution (F, T, F&T)
BB_1	V1	Orthorectify optical data	V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
BB_2	V1	co-register optical data	V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1		V1				
	V1	coregister homogeneous optical data	V1				
	V1		V1				
BB_3	V1	Radiometric calibrate optical data	V1				
	V1		V1				
	V1		V1				
	V1		V1				

Figure 8. Some columns of System Evolution Characteristics Questionnaire as sent to suppliers

Service Sustainability

Taking into account the agreed set of reference operational scenarios, two major streams of the project were exploited to deliver alternatives of service architecture proposed in conclusion the project:

- Service chain questionnaires, to understand evolution of contributions at mid and long term.
- Service chains activities, to determine candidate building blocks and their contribution to each security service as demonstrated to the User Community.

The sustainability of any operational service chain could be hindered by solutions based on a unique building block" or a unique organisation. Moreover, funding multiple similar building blocks could w funding schemes. Such vulnerabilities were reported to the GMOSAIC governance board, as a decision aid, to promote and fund the most promising options: alternative organisations aiming at providing equivalent contributions, to either critical or to all service chains depending on actual updates to service value analyses. Sustainability was considered from three major perspectives: (a) structure &organisation, (b) evolution & operational attractiveness (c) funding schemes. The activity emphasized:

(a) The existence of alternatives to provision service chains along at mid and long term. Alternatives are concretely represented by building blocks, system and organisational;

(b) The evolutionary nature of identified alternatives, so as to keep attractive w.r.t to market and technology evolutions. The building blocks might be elected for funding based on value vs. needed cost, along the security roadmap.

(c) The existence of a funding scheme to support the evolution of elected/electable alternatives.

This called for the identification of critical chains at mid and at long term, starting from demonstrated, short term service chains. While service teams were testing service chains for demonstration of feasibility, the architecture team consolidated mid and long term feasibility of critical service chains. Single and multiple provision sources were highlighted, and trade-offs for a sustainable scheme was presented and discussed with the Customer and service providers. Alternate actors and building blocks were proposed by the consortium at the second annual review of the project.

Evaluation of service provision alternatives

The analyses of cost and value relied on a finer grain of the GMOSAIC cost model, which considered the cost of building blocks, the cost of expertise, and the costs of interactions with the service chain leader to integrate and qualify the service chain as a whole. The method is illustrated by the Damage assessment capability, for which a service chain was actually triggered during the project by UN to evaluate damages of the Haiti's earthquake, 2010.

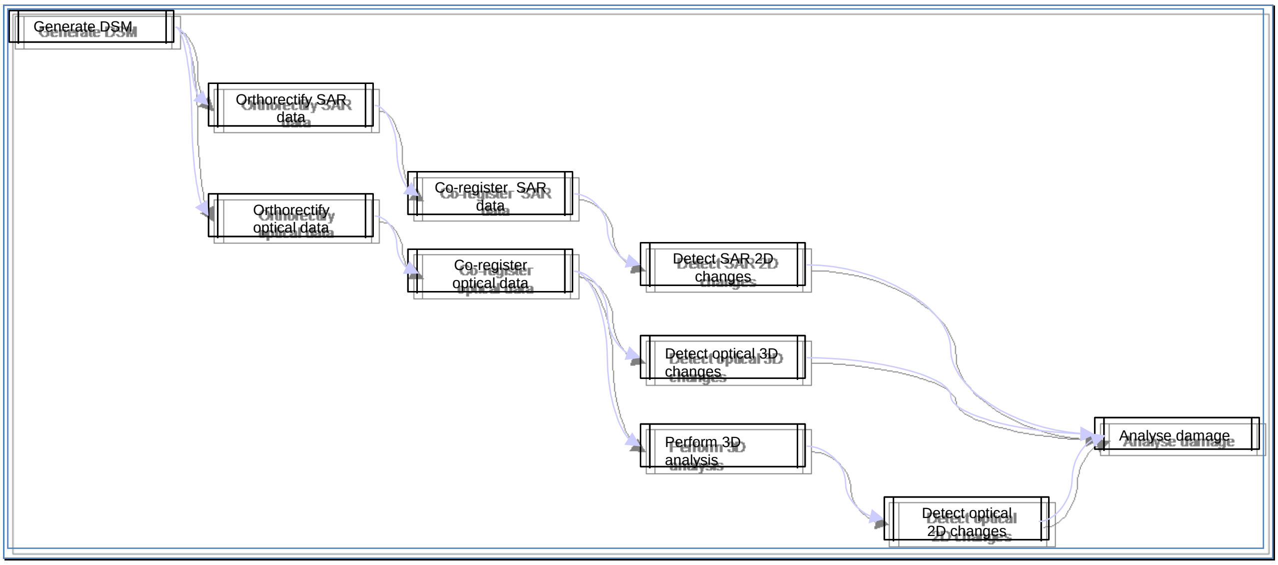

Figure 9. Damage assessment service logics

The evaluation and comparison of alternate service provision solutions took into account, apart from requirements for maps and reports and candidate building block specifications, a set of cost parameters and a set of hypotheses to compute the level of confidence associated to supplier's building blocks roadmaps. The level of confidence was computed and considered for comparison of alternatives at mid and long terms. From the first proposal to this collaboration and until it did deliver the expected results, the three teams had to face many obstacles:

- Lack of patterns to develop service funding schemes, as the majority of stakeholders were mainly product suppliers. The opportunity came from a separate project aiming at developing revenue models for another GMES project: the architect had the support of the project management and the customer to acquire this expertise, in order to deliver credible evaluation results. It became possible to send efficient economical questionnaires, thus involving building block owners and service chain owners in the evaluation process.
- Lack of accurate data on evolution of costs and of value to the end users, in some cases, lack of the short term data. The architecture team added a confidence level to distinguish contributions according to the clarity of functional an quality evolution of the candidate building blocks, for each agreed operational scenario.
- Unavailability of service chain leader, as they were involved in pre-operational service integration and qualification.

A substantial enabler came from the casting of the Cost &Funding team, which included motivated and high skilled personnel, neutral from service provision point of view, and well involved in similar activities for GMES programs. With the support of Customer & project management, a cost & funding questionnaire was prepared collaboratively by leaders of Conops, Cost &Funding, and Architecture teams, and, after three loops of that questionnaire within stakeholder organisations, architecture team included:

- The "Conops" team could exploit value analyses parameters and outcomes w.r.t. reference and forecast scenarios.
- The "Cost & funding" team could use economic data w.r.t capability analysis and forecast scenarios.
- The architecture team could exploit economic and value analysis data to compare alternative of service provisions solutions across operational thematic. The risk of each alternative was also considered, using the confidence level computed over the filled (and unfilled part of the) questionnaires.

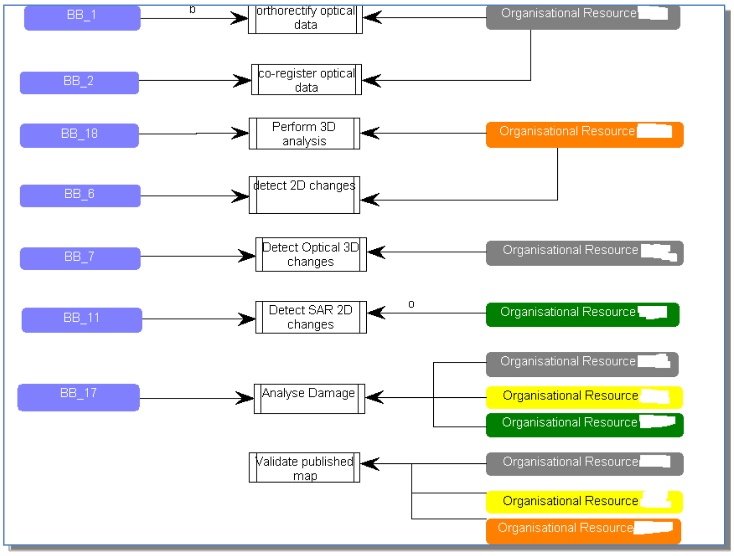

Figure 10. Service Provision Alternatives

Figure 10 depicts a service provision view, as enabled by a leading COTS and it NAF v3 add-on, consistent of the service chain logics as depicted by Figure 9. The result, although satisfactory for a simple example, requires more features for a sound description of alternatives provision solutions, taking into account baseline and target sources of provision. Another required feature is the representation of solutions evolution over time, whether for building blocks, organisations or provisioned services. This feature is provided for capability phasing, but is not repeated for the architecture concepts contributing (i.e., traced back to) to a capability increment. Customisation efforts improved the model, however the architects should concentrate on architecture, therefore we expect from architecture tool vendors to be more proactive, to contribute and improve their tool according to the actual evolution of architecture norms and standards.

At the third loop, the questionnaires were considered by stakeholders as stable enough to be exploited for a credible evaluation. Figure 11 depicts the level of confidence, evaluation and comparison of service provision alternatives for one of the eight thematic service chains. It exploits the outputs of Costs and funding models work packages. Costs were provided to the architecture team for the complete service chains, building blocks and expertise included, however, the method is still valid using actual cost of each building block and related operational expertise to deliver each step of the service chain.

The analyses of alternatives are therefore adapted to cope with aggregated inputs as follows:

- The mean average cost was computed per building block, using the service chains costs model.
- Per service chain:
  - Identify the potential to replace one or more building blocks at short, mid, long term
  - Determine the value those changes could bring the service chain: better performances, more functions/more indicators, any others

- o Determine the value those changes could bring to other service chains, when applicable.
- o For each potential change, identify the cost of the alternate provision, at mid and long term. The cost is given as an evolution constant multiplied by cost of usage of the short term BB. This constant can be used to simulate "what-if" conditions that may be considered to actually sustain service chains, taking into account the cost current cost model.

BB ID	BB1	BB2	BB6	BB7-c	BB8	BB11	B17	B18	Evol confidence level	Cost	Risk	Total cost	Nb Assignments
functionality	Orthorectify Opt data	co-register optical data	Detect 2D changes	Detect Optical 3D changes	Detect Optical 3D changes	Detect SAR 2D changes	Analyse Damage	Perform 3D analysis					
Damage assessment provision options													
DAP alternative 1	1	1	1	1		1	1	1					3
providers									4,43	31648,32	0,05	32005,64	
DAP alternative 2	1	1	1		1	1							
providers									1	31172,13	0,07	33398,71	
DAP alternative 3	1	1	1		1	1	1	1					
providers									1	31245,39	0,07	33477,20	
Cotes													
Best Alternative cote	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	0 or 1 or 2:	Average	Total cotes			
Short term evolution	2	1	2	2	0	1	2	2	1,71	12			
Mid term evolution	2	1	2	2	0	1	2	2	1,71	12			
Long term evolution	2	1	2	0	0	1	0	1	1,00	7			
Total evolution cote	6	3	6	4	0	3	4	5	4,43	31			
Nature of evolution	F	T	F	F	NC	T	F&T	F&T					

	Decision	Rationale for Alternative		
	Yes/No		Elect Alternative	Sustainability Rationale
DAP alternative 1	yes	Demonstrated. Evolution roadmap documented	ALT1	This service chain shows a higher evolution (F&T) confidence level, and lower risks at mid and long term to satisfy evolution of constraints (eo data) and needs.
DAP alternative 2	no		ALT2, ALT3	These two alternatives combining building blocks are potentially promising. Roadmap is less documented (see BB8), so confidence in evolution is lower, leading to higher costs
DAP alternative 3	no			
	Evaluation principles		25641	*Cost DAP from cost model*
			0,05	risk, BB documented/roadmap
			0,2	risk, BB non documented/roadmap
			0,15	Mean cost overhead (F & T)
			0,02	Mean cost overhead per BB (T)

Figure 11. Evaluation findings for Damage Assessment service chain

An example of evaluation outcomes is provided in Figure 11 on damage assessment capability (NB. values of QoS and service level agreements are not shown to respect project policies). The principles of selection of promising service provisions are summarised here.

- Given a service chain, any promising evolution of the building blocks provisioning part or whole of the service contribution, shall be visited and marked (using a cote) for potential investment. The mark shall take into account the number of service chains where such a building block may bring added value. This corresponds to any line in the roadmap model showing an ability to enrich the functionality and or improve the quality of service of related service chains: (i) Technical evolution was allocated 1point, (ii) functional evolution: 2 points. (iii) Functional and technical: 2 points.
- When multiple alternate building blocks are identified and have the same level of pre-cited ability, the priority is given to the blocks which maximise the score (i.e. total of points).
- Where multiple alternatives have the maximum score, the decision board could promote building blocks which support more service chains, to optimise the return on investment. However, this should not hinder the diversity of building blocks: Apart of existing building blocks (e.g. BB_7) which support different functionality by definition, the diversity policy is used to make sure that no other building block is concentrating more functionality than it did at short term.
- Where the evolution roadmap shows stability in building block implementation, the cote was enforced to as such alternative represents less risk for change, migration, training and maintenance at midterm. However, for a long term milestone, where technical obsolescence or business strategy changes may occur, provision had to be discussed to consider alternate building blocks worth to fund.
- Where the evolution roadmap model showed uncertainty (or holes), the cote had to take into account potential risk, at least in matching long term expected functionality or quality, or both. Therefore, "no evolution to building block" at mid and long term perspectives, as well as "empty cell" had zero point.

This evaluation would have been eased by the use of some COTS to *view and simulate* evaluation based on many more criteria, showing key thresholds for alternative added value, however, such tools remain expensive, and are not affordable for architecture feasibility studies, although this is where they could bring real value. Knowing that later, i.e., in the governance of implementation processes, it is often too late to anticipate on key service provision issues, the expectations on tool editors are high, from the architect's perspective:

- Ability to provide alternate solutions, at affordable costs, to support architecture feasibility studies: the architects are interested in hiring some tools for the duration of a study, when they cannot afford for license acquisition and maintenance.

- Ability to share customisation costs where it makes sense, i.e, where it provides benefit to the large Architect COI. Customization efforts should be shared between the tool vendor and the Architecture COI when the tool fails to implement the standard/norms as it should.

- Ability to contribute to architecture studies in a reasonable work share: Unless a balance is obtained between domain knowledge capture, operational &technical efficiency and architecting efficiency, one property of the three is often jeopardized to respect project milestones.

CONCLUSION & RECOMMENDATIONS

The paper presented in brief GMOSAIC vision, scoping issues, architecting principles and some models to illustrate alternative of architecture construction and evaluation approaches. It provided some definitions and project-related rationale for service sustainability, illustrated through one of the eight capabilities considered in the architecture study. Architecture evaluation principles have been provided, and explained w.r.t project context and constraints. However, this approach remains applicable using more accurate economic and phasing data, to deliver, where necessary, more accurate results, i.e., more or less options on the most promising capability configurations.

As a perspective, a recommendation of the architect team to the governance board is to extend the funding model to simulate "what-if" conditions at service levels, taking into account the evolution of customers and subscription fees along the security roadmap.

Regarding the architecture framework and its current implementations in COTS, a major recommendation to tool editors would be put more effort to understand the added value of the framework in a the day life of Enterprise and System Architects, and to provide affordable solutions that can actually ease tool adoption at architecture governance as well as at architecture implementation phases.

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