



Norwegian nanosat project in GSTP Program –European Space Agency-

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European Space Agency

ESA TECHNOLOGY PROGRAMMES OBJECTIVES

- **Enabling ESA and national missions** by developing technology
- Fostering **innovation** by creating new products
- Supporting **competitiveness** of industry
- Improve the **technological non-dependence** and the availability of European sources for **critical technologies**.
- Facilitate **spin-in** from outside space sector

GSTP – OVERVIEW-



- Is part of ESA's Optional Programmes. Covering all technology disciplines and applications except Telecommunications (covered by the ARTES programmes).
- Based on a five-year Work Plans, with yearly updates.
- The Budget envelope for GSTP-6 (including all the three elements)= **948M€**
- Activities are mainly development of technologies and products starting **TRL (4)** to qualification
- Domains concerned: Platform, Payload, Ground Segment, and Engineering tools.
- **Specific area**/cross cutting through work plans (e.g. Clean Space, SAVOIR, AM...)
- Preparatory activities for future technology breakthrough missions eventually to be implemented in separate ad-hoc Elements (**Element N**) through projects for small size S/C.
- Compendium of potential activities published yearly (and regularly updated) on EMITS, for discussion with national delegations and industry.



GSTP-6 -DEVELOP– activities



- **Compendium** (on **EMITS news website**) => if industry interested needs letter of support => supported activities are put in work plan => for IPC approval
- **Proposed by TOs**, approved by TecNet and put in the compendium (
- **Unsolicited proposals (industry)**, DN, need letter of supports => to be put in the work plans for IPC approval.
- Frames:
 - ✓ **Preparatory and De-risk activities:** first assessment of the feasibility of the project (paper work, BB, or tests – radiation tests-)
 - ✓ **Norway Initiative** (was foreseen for Oil and Gas industry but is kept larger for all domains in space, many proposals , 3 activities are already running (contracts placed).

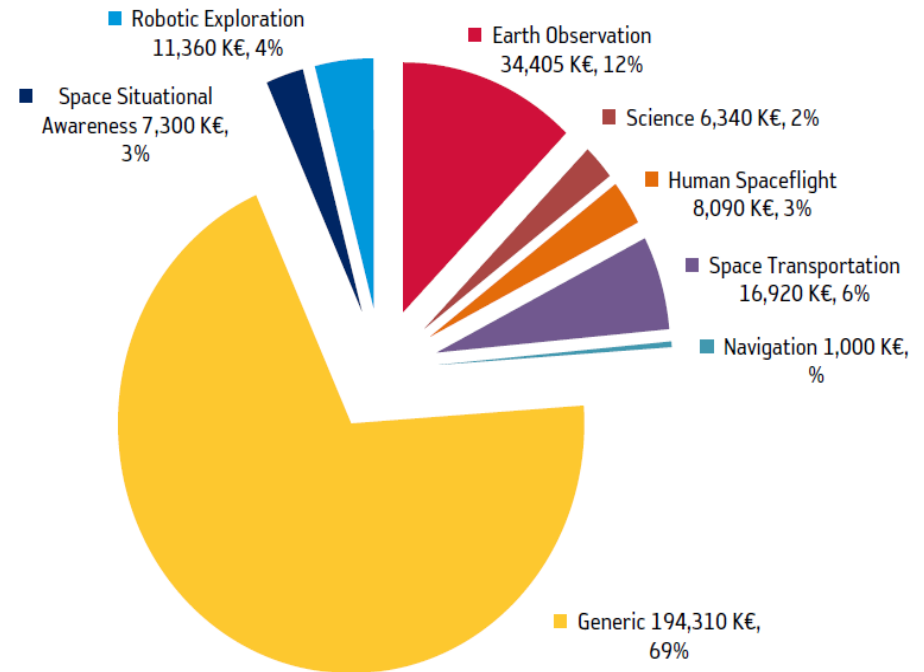


Figure 1: Budget distribution of GSTP Element 1 DEVELOP activities by Domain



GSTP-6 -MAKE – Competitiveness (AO)



- Objective: open calls to industry unsolicited proposals with a strong market-oriented activities. A realistic business plan to be included – customer well identified (not only ESA projects).
- Permanent Call open in EMITS (AO7935)
 - Submission outline Proposal (Template in ITT package) with Letter of Support from relevant Delegation(s) => Evaluation Experts & GSTP Management
 - => Invitation to submit Full proposal => TEB Evaluation Full Proposal = Target for Evaluation of outline proposals=10 working days.
 - => ps:if Outline is rejected: bidder is informed. Debriefing can be made if requested.

	SME	Non SME	Research Inst. & Universities
TRL <= 5	Up to 75%	Up to 75%	Up to 100% (<30% total)
TRL > 5	Up to 75%	Up to 50%	Up to 75%



GSTP-6 -FLY – Technology Flight Opportunities (TFO)



- In-orbit Demonstration of technologies and products
- **Target** TRL is **8** (ECSS-E-AS-11-C: FM is qualified and integrated in the final system ready for flight)
- Essential for products requiring **flight heritage** for commercial customers
- Development and consolidation of capabilities in Member States
- Does **not** include technology development (Development activities shall be in GSTP–DEVELOP-)
- Flight **opportunities** are identified with ESA projects and launches, with National agencies and with primes, and with commercial missions.
- Special relation is established with National programmes with demonstration objectives
- Call for flight needs and opportunities published in ESA web site: EMITS
 1. **Frame work** (accommodation studies): instrument developments, technology maturation...
 2. **Frame work for missions 10 M€** : each mission up to 2.5 M€ - still to be discussed and approved by IPC.
- Participating States are: Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Spain, Sweden and United Kingdom.



GSTP TFO CubeSat missions



Mission	Supporting Countries
RADCUBE/RADMAG Mission	HU
GOMX-3 Demonstration	DK
GOMX4-B In-Orbit Demonstration	DK, SE
VIRSI In-Orbit Demonstration	NL
SIMBA	BE
PICASSO	BE, UK FI
QARMAN	BE
OPS-SAT Phase B2CDE	AT, DE, PL, DK



Some elements about the Norwegian project



The Norwegian project Initiative



- ESA will issue in GSTP Element 6.3 (Technology Flight Opportunity) in 2017 the Request for Proposals for a **Phase A study** for a Norwegian Mission.
- The budget for the Phase A will be split in two phases : **Phase A** ~250K€ , and **Phase B** (250 K€), if the study gives enough evidence of the feasibility of the mission, then the decision should be taken towards a **full phase C/D/E**, provided that a all the selection criteria are satisfied.
- Depending on the outcome of the study and following the interest of the Norwegian Delegation, ESA will offer the possibility to implement the full mission (**Phase B, C/D/E**).
- **NSC ESA roles in this project:**
- NSC defines the main programmatic drivers while delegating the technical and programmatic execution responsibility to ESA.
- NSC/ESA are jointly taking the main decisions : Phase A, Phase B, Phase CDE.



General assumptions for the Phase A procurement



- The ITT is an open competition to all Norwegian Companies /Consortia , R&D/academia
- Proposals shall be made for a **concept mission** with a technical/scientific/applications merits.
- Proposals shall be within the financial and mass budget envelope (SOW)
- Companies shall come up with one **Baseline** and one **solid Option for the mission concept** in both cases, prime should make extensive use of what exist and what has been developed so far in **Norway**.
- The final decision will be to select ONE Norwegian mission to go for a phase B and later C/D/E.
- Equipment and P/L assessment exercises during the phase A study are mandatory.
- For equipment, RFI will be the tool used (a RFI template will be attached to the SOW)
- For the P/L assessment , an AO will be run under the supervision of ESA (using EMITS) (template will be attached to the SOW).
- The final P/L selection will be made by ESA/NSC based on the input of the AO.
- Input for the AO and the RFI shall contain the following (not exhaustive list): TRL, a detailed list of components/elements that need to be further/developed, total mass, the performances, interfaces, the applications and the related business case.



Some indicative RFI/AO elements



During this exercise, the some information is needed such as:

- Company/ academia names
- Description of the product/ P/L: what it is? Application? Dev. Context (development context)
- Performances
- Product Flight heritage (Y/N)
- Needs/or/NOT : delta dev. After discussion with Prime (s): potential changes to the existing product/P-L: cost, implication or not, on interfaces.. For the purpose of the Norwegian project,
- **Output of these exercises :**
 - Summary table with a categorization based on: exact TRL, Plan, schedule, cost and risks, flight heritage, delta dev., interfaces with the S/C....

- The main objective of this exercise is to provide a comprehensive report with a self explanatory table containing all S/C elements and P/L based on the above mentioned elements and the missing S/C elements that need to be procured outside Norway.



Expected Outcome of the Phase B study



- Mature technical project
- A Detailed costing of the Phase B2, C/D/E. Including Space , Ground Segment, AIT, Launch and Mission Operations with a Nominal Mission lifetime assessment.
- A realistic project plan, with detailed work packages and an efficient distribution of tasks based on the role of the industrial team in the projects.
- A solid and logic payment plan based on the project needs that shall be well justified.
- **Key roles in the project:** such as, system engineers, thermal expert, propulsion engineers, P/L system AIT engineers, PA/QA expertise... **experienced** experts (shown in attached CVs in the proposal for phase B).
- A final list of “buy “, “make” nationally, procure outside NO is attached to the proposal.
- Clear plan/ pre-agreements for items to be procured outside Norway to be submitted to NSC/ESA for approval.
- A consolidated business case based on ROI analysis and future plans
- No technology pre-development will be accepted during phase C/D/E
- Option for a launch opportunity and launch compatibility assessment is a must.



Thank you

