

# Overall status and progress of SPIS project development

**J.-F. Roussel** *ONERA / DESP*

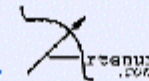
and the project team:

**F. Rogier**, D. Volpert, M. Lemoine *ONERA / DTIM-DPRS*

G. Sookahet, P. Sèng, **Y. Lerumeur**, M. Biais, **M. Penzi**  
*ARTENUM*

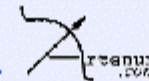
G. Rousseau *U. PARIS 7*

+ **J. Forest** *IRF...*



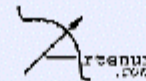
# Outline

- Introduction: from an Concept to a Birth
- SPIS Development Organisation (*reminder*)
- Project Development Logics
- Current SPIS status
- Objectives of this meeting
- Future
- Related activities
- Meeting agenda



# From a Concept to a Birth

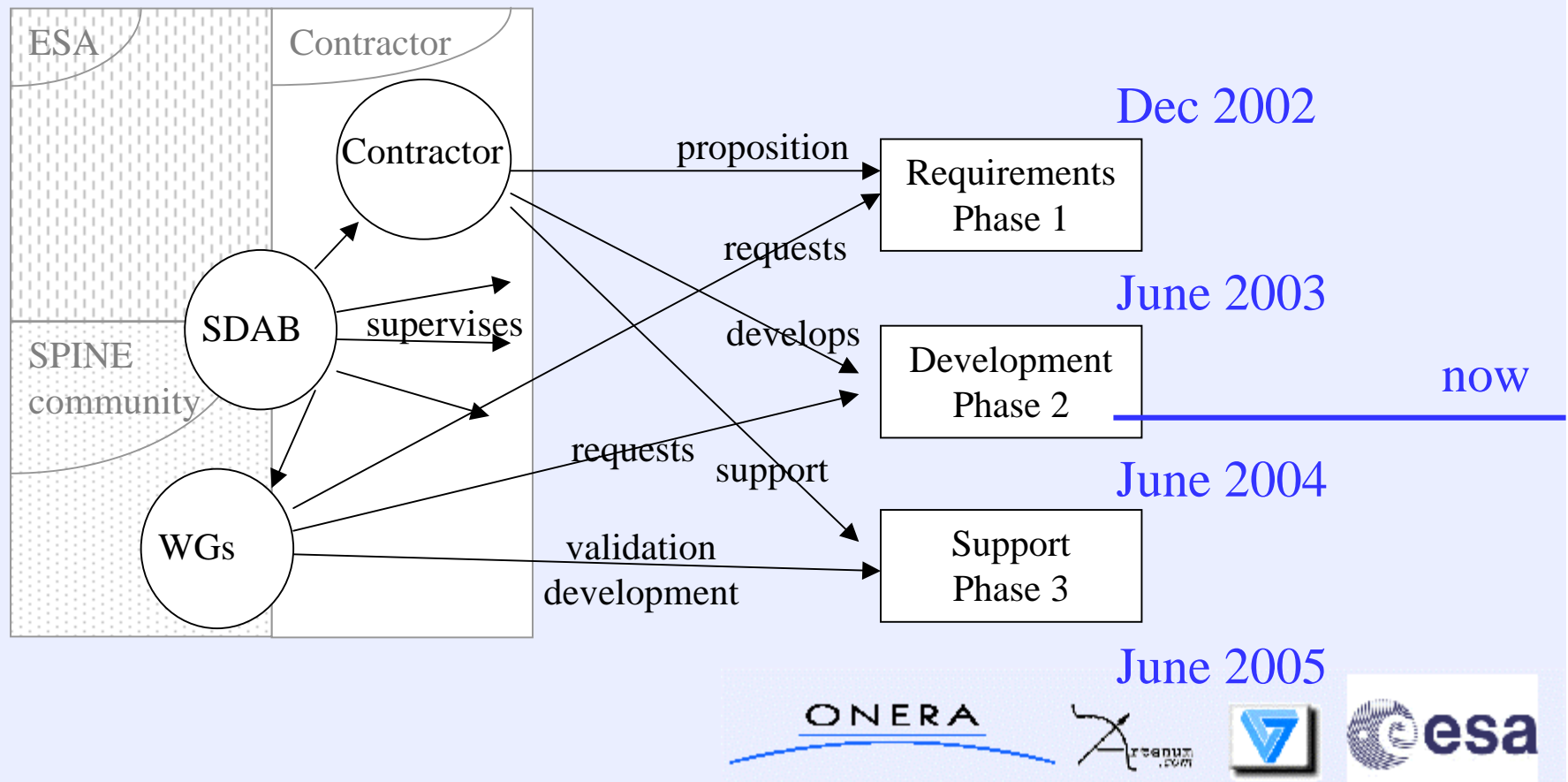
- One year ago: 4<sup>th</sup> SPINE meeting –  
Community Requirements
- 9 months ago: PDR
- 6 months ago: 5<sup>th</sup> SPINE meeting –  
Development Status
- Today: A new code is born  
*it is only a new born...*  
*expecting now to be grown by his:*
  - *parents*
  - *uncles, aunts and relatives...*



# SPIS Development Organisation (*reminder*)

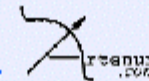
## ➤ Three major entities:

- ★ The contractor: proposes requirements and design, develops software, supports WGs
- ★ Software Development Advisory Board (SDAB): supervises and orients development
- ★ Working Groups (and whole SPINE community): expresses requirements, participates to the development, tests the software



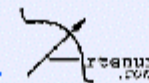
# Project Development Logics

- SPIS is not a one-button-click software
  - ★ Ever:
    - ★ Rather a research code than an engineering code (at least in its first version)
    - ★ Highly modular/customisable
    - ★ Yet, more packaged, two-button-click versions can perhaps be developed later
  - ★ Even more true today:
    - ★ Really the first operational version (alpha)
    - ★ This is the project logics: you're part of it, you're also developers, not (simply) users!
- Importance of the community



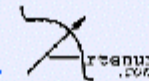
# Current SPIS status

- Framework (UI and more):
  - ★ Pre-processing: CAD, meshing, group management
  - ★ Post-processing: results viewing (partial)
- Numerical core, or solvers (NUM):
  - ★ Main solvers: PIC integration, Poisson (Conjugate gradient, linear/non-linear)
  - ★ Low level classes: a lot (particle fields handling...)
  - ★ Medium level classes: PIC distributions, fluid distributions, E field, plasma, spacecraft, material model (partial), ...
  - ★ Highest level classes: 2 examples: LEO example, GEO example...  
*all relatives can now (or after this course) teach more to the new-born*
- Interfacing:
  - ★ Framework → Solvers: meshes ok, fields (material Id...) still to be finalised
  - ★ Solvers → Framework : results import ok



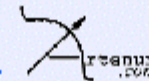
# Objectives of this meeting

- Learn how to use SPIS
- Be able to start customising SPIS and integrating new modules
- Feed back to contractors: usage difficulties, lacking functionalities...
- Agreement on extensions
- Enhance Working Groups dynamics, fundamental for next steps, in particular for next support phase



# Future

- Release of extensions in June (2004)
- WG activities with contractor support:
  - ★ 3<sup>rd</sup> quarter 2004: full support for WG1 (sheaths)
  - ★ 4<sup>th</sup> quarter 2004: full support for WG2 (EP, etc.)
  - ★ 1<sup>st</sup> quarter 2005: full support for WG3 (material properties)
- A SPINE meeting every 3 months from now on

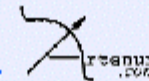




# Related activities

## Two other projects in the same ESA mini-project

- Charging Handbook and Guidelines:
  - ★ Presented by D. Rodgers (QinetiQ) this morning
- Material properties (experimental):
  - ★ L. Levy (ONERA) and M. van Eesbeek (ESA) are not present
  - ★ More exchanges at next SPINE meeting (June, in Toulouse)
  - ★ Status as of today: they are working... a few of ideas:
    - ★ Secondary Electron Emission (SEE): open database, SEE data encouraged to be the whole yield(E) curve since description by 2 parameters is too coarse (possible in SPIS/NUM)
    - ★ Induced conductivity:
      - ★ Physics:  $f(E, \text{dose rate})$ , at any point, locally within coating depth
      - ★ Numerical: should handle depth profile of dose in SPIS/NUM (possible), because of its dramatic importance
- Importance of communicating between the three (micro) projects



# Meeting agenda

## Sunday 14 March 2004

9:00	Departure from the hotels for a Briefing at IRF
10:00	Dep. from IRF for ESRANGE launch area visit
13:00	Dep. from ESRANGE to Jukkasjärvi: visit of Ice-hotel, possibility of outdoor activities
18:00	Adjourn

## Monday 15 March 2004

### PLENARY SESSION

8:30- 10:00	Welcome - Intoduction – Status of SPIS project and related activities
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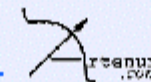
### PLENARY SPIS COURSE: appropriation of the whole computation chain on the basis of provided examples

10:30- 12:00	SPIS installation procedure SPIS framework (1st part)
12:30-1330	Lunch

13:30- 17:30	SPIS framework (2nd part) SPIS numerical core
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### AURORA EVENING

18:30	Invited Lecture: Aurora Borealis
19:30	Dinner at IRF
21:00-...	Aurora watching (local and space weather permitting)



**Tuesday 16 March 2004**

**SPIS COURSE PER WORKING GROUP: elaboration of each WG test case**

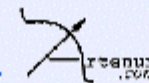
	<b>WG1</b> Physics: sheaths Test case: Cluster	<b>WG2</b> Physics: artificial plasmas (EP...) Test case: SMART-1	<b>WG3</b> Physics: material interactions Test case: high level charging (Freja, SCATHA...)
8:30- 12:30	WG1 on the computers: starts building its challenging test case with full contractor support	WG2 on the computers with WG1: either also works on WG1 test case, or starts working on its own test case with reduced contractor support	WG3 session: review of data and issues, preparation of its test case modelling
12:30-13:30	Lunch		
13:30- 17:30	WG1 session: review of data and issues, further preparation of its test case modelling	WG2 on the computers: starts building its challenging test case with full contractor support	WG3 on the computers with WG2: either also works on WG2 test case, or starts working on its own test case with reduced contractor

**Wednesday 17 March 2004**

**SPIS COURSE PER WORKING GROUP: elaboration of each WG test case (cont'd)**

8:30- 12:30	WG1 on the computers with WG3: either also works on WG3 test case, or goes on working on its own test case with reduced contractor support	WG2 session: review of data and issues, further preparation of its test case modelling	WG3 on the computers: starts building its challenging test case with full contractor support
12:30-13:30	Lunch		
13:30- 17:30	<b>CLOSING PLENARY SESSION</b> (+ possibility to continue test case simulation for some attendees) Debriefing of the course: difficulties with the framework and numerical core - needs of the WGs to perform finalise their modelling Preparation of the future: discussion of SPIS extensions by contractor and WGs contributions		

# Backup charts



# Development Plan: 1-Requirements

Date	Meetings					Activities during and between the meetings		
	Project meetings	SPINE meetings	location	Meeting objectives	Attendees	Contractor	SDAB ESA TO	SPINE members
T <sub>0</sub> : Dec 02	Kick-off		EST EC	agreement on activities and schedule, start of the activities	ESA Contractor			
						Prepares: - preliminary URD - upgraded web site	/ (SDAB not yet defined)	Prepare workshop: - requirements - methods - PicUp3d tests
T <sub>0</sub> + 3m: Mar 03	PM1	SW4	EST EC	<b>Challenge workshop:</b> - Define SDAB and WG members - Specify user requirements (URD)	ESA Contractor SDAB SPINE members	- Presents preliminary URD - Collects requirements - Releases WI	- SDAB designation - Prioritise requirements	- Present their methods, algorithms and requirements
						- finalises URD - prepares SRD, and top level design	Agrees finalised URD	- Prepare some routines - WGs define test cases
T <sub>0</sub> + 6m: June 03	PM2 <b>PDR</b>		ONE RA Toulouse	Preliminary Design Review: - Presentation and agreement on SRD and top-level design	ESA Contractor SDAB	- Presents SRD, top-level design - Collects change requests	- Agrees SRD and top-level design	

# Development Plan: 2-Development

Date	Meetings					Activities during and between the meetings		
	Project meetings	SPINE meetings	location	Meeting objectives	Attendees	Contractor	SDAB ESA TO	SPINE members, WGs
						UI development prototypes routined	Supervises development and WGs' work	- Prepare some routines - WGs define test cases
T <sub>0</sub> + 9m: Sept 03	PM3	SW5	EST EC	- Qualification review and release of SPIS/UI - Agreement on routine co-development	- ESA - Contractor - SDAB - SPINE	- Presents the release of UI - Organises the discussion about routine development	- Agrees released SPIS/UI - Agrees future developments	- Present WGs' work: requirements and planned developments
						- prepares routines for NUM v1	Supervises development and WGs' work	- Test of UI - Prepare some routines
Dec 03	PM4		ONE RA	Report progress of NUM routines	- ESA - Contractor	- Presents NUM status	"	
						- NUM v1 and integration	"	"
T <sub>0</sub> + 15m Feb 04	PM5	SW6	EST EC	- release of NUM - Course on NUM-UI and routine integration - Agreement on routine development	- ESA - contractor - SDAB - SPINE members	- Presents UI- NUM v1 - SPIS course - Organises the discussion about new routines	- Agrees NUM - Agrees new routine development	- Report testing of SPIS/UI - Attend SPIS course

# Development Plan: 2-Development (cont'd)

Date	Meetings					Activities during and between the meetings		
	Project meetings	SPINE meetings	location	Meeting objectives	Attendees	Contractor	SDAB ESA TO	SPINE members, WGs
						extended NUM development	Supervises	- Test NUM v1 - Developments NUM v2 -: preparation of M1 of WG1
T <sub>0</sub> + 18m June 04	PM6	SM7 WG1 M1	ONE RA, Toulouse	- Release NUM v2 - Meeting 1 of WG1: list of problems and proposition of new development by WG1	- ESA - Contractor - SDAB - SPINE members	- Releases SPIS v2 - organises M1 of WG1, advises WG1 development	- Agrees SPIS v2 - agrees WG1 plans	- WG1: meeting 1

# Development Plan: 3-Extension/support

Meetings						Activities during and between the meetings		
Date	Project meetings	SPINE meetings	location	Meeting objectives	Attendees	Contractor	SDAB ESA TO	SPINE members, WGs
						support and bug fixing	Supervises WGs' work and contractor support	- WG1: development and integration of extensions - WG2: prepares M1
T <sub>0</sub> + 21m Sept 04	PM7	SM8 WG1 M2 WG2 M1	EST EC	- WG1 Meeting 2: report of routine integration results, testing and problems - WG2 Meeting 1 - Status of bug report and fixing, and support	- ESA - Contractor - SDAB - SPINE members	- releases SPIS/WI v2: LibreSource - reviews WG1 development and testing - advises WG2 development	- Agrees WG1 development - Agrees WG2 plans	- WG1 M2: provides outputs for SPIS v3 - WG2 M1...
						...	...	...
Dec 04	PM8	WG2 M2 WG3 M1	ONERA, Toulouse	...	...	...	...	...
						...	...	...
Mar 05	PM8	WG3 M2	EST EC	...	...	...	...	...
						...	...	...
T <sub>0</sub> + 30m June 05	FP	SM 11	EST EC	- Last release (v5) - Final presentation - Acceptation of final deliveries	- ESA - Contractor - SDAB - SPINE	- releases SPIS V5 - Final presentation	- Agrees release V5 - Final acceptance	- Final report of testing and development plans for future



# Reminders about the web site

- Summary of restricted download areas:
  - ★ PicUp (form on the web to get a password)
  - ★ SPIS code (form on the web)
  - ★ WG restricted areas (login/passwords sent to WG members)
- Forums
  - ★ two forums were set-up (<http://spis.onecert.fr/forums/index.php>): general and PicUp3d, but more can be set-up
  - ★ traffic should increase with WG activity
  - ★ Can be parameterised to be more or less public/private

