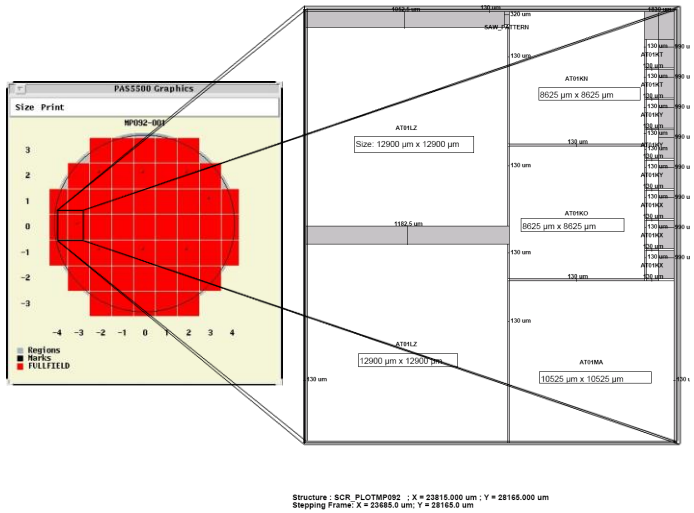
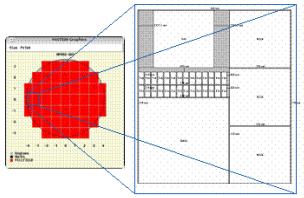
ATC18RHA ESA SMPW

ESA contract 17767/03/NL/FM
Valérie BRIOT



ESA Last Presentation day May 27th, 2013

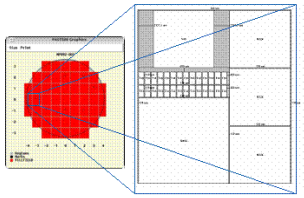
ESA/CNES meeting, 2010 Dec. 1-2nd



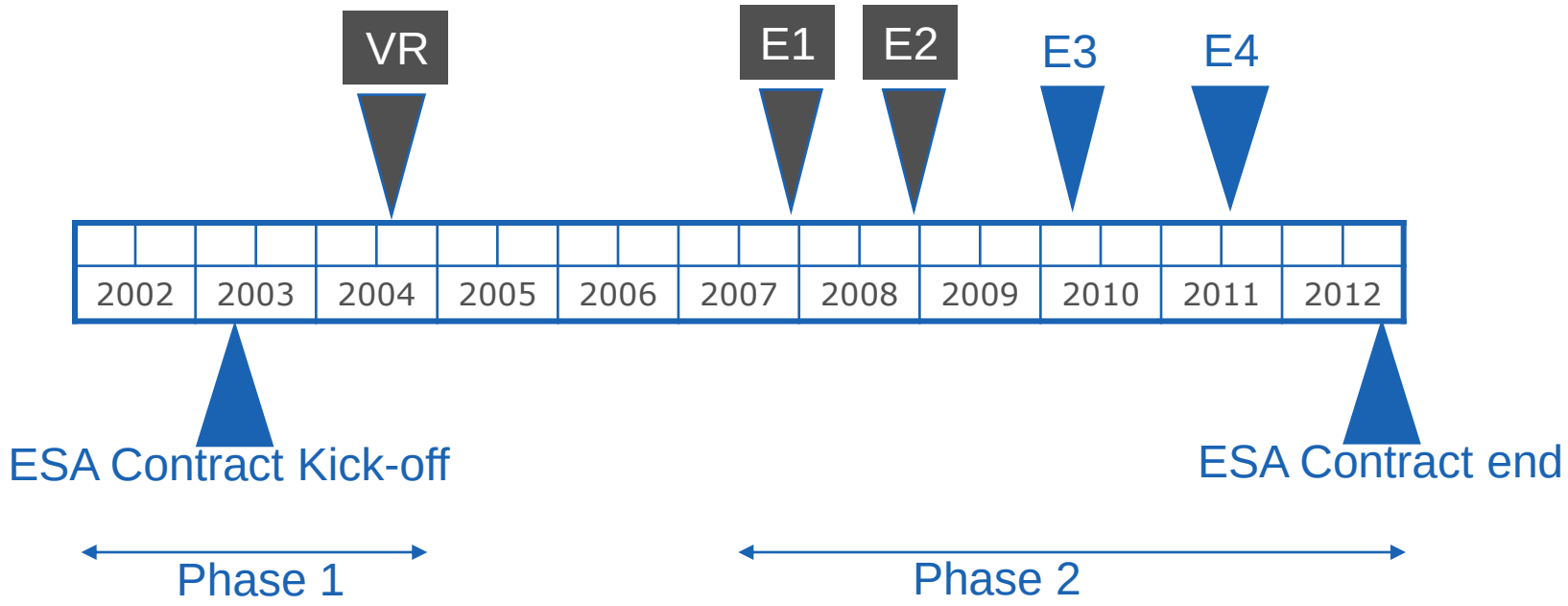
ESA SMPW
Objectives

- For the ATC18RHA ASIC series
- A service for ANY European Space Customer
- Reduced manufacturing non recurring costs of ASIC development by sharing the reticules and silicon costs between several designs
- Same set of reticules for Prototyping and Flight Models

ESA SMPW

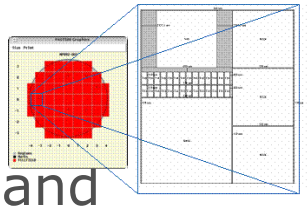


In perspective



- Phase 1 (WP1): 500K€ SMPW management and technical set-up + verification through Validation Run
- Phase 2 (WP2-WP3): 1.5M€ for 4 SMPW runs

ESA SMPW



WP 1 – Assessment and definition of SMPW Technical and Management Procedures

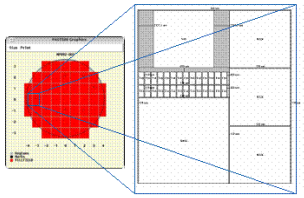
- STATUS: **COMPLETED**

- REFERENCE

  Technical and management procedure ADF-DE-R0733-VUL, 2004 Oct

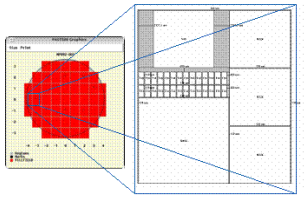
  SMPW Validation run report ADF-PL-R0810-VUL, 2005 May

ESA SMPW



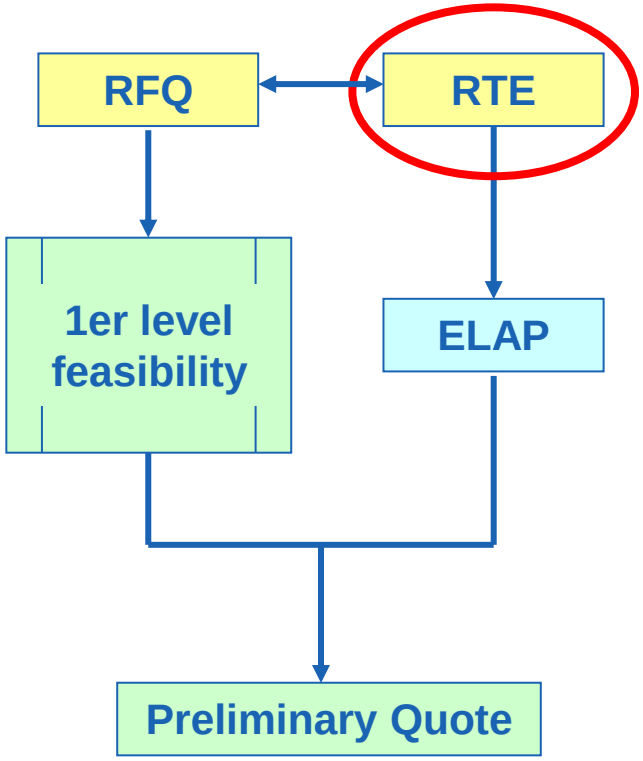
- No design constraints specific to SMPW
  - Each design is developed independently of the others
  - Specific milestones added in ATC18RHA design flow
- SMPW is a Space foundry service
  - The SMPW is limited to reticules and wafers manufacturing
  - One reticules set for all the designs embarked
  - Several designs manufactured on the same wafer
  - Wafers split in sub-lots assigned to 1 design
- SMPW runs launched at fixed dates made public in advance to the space community
- Each run includes
  - Reticules manufacturing
  - 1 lot with priority for prototyping
- Complementary lots for Flight Models can be launched
  - With the same reticules
  - Without date restriction

ESA SMPW

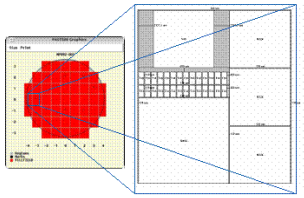


WP 1 – Assesment and definition of SMPW Technical and Management Procedures - Specific milestones (1/4)

- RTE: Request To Embark
  - On top of the technical information for feasibility study
  - Customer provides to Atmel necessary information for quotation on SMPW
    - Space project
    - Target SMPW run
  - If eligible to a reserved SMPW ESA, Customer to provide the filled in RTE document and Atmel relays it to ESA for approval

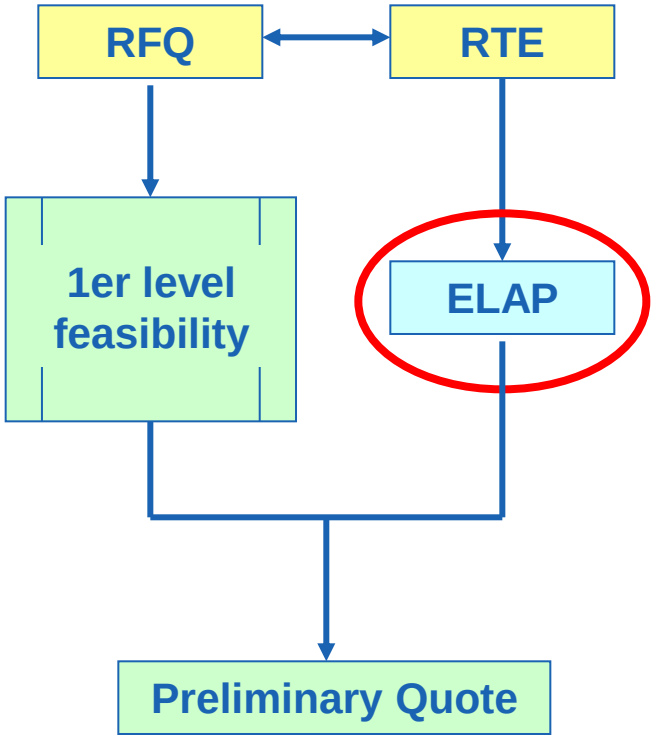


ESA SMPW

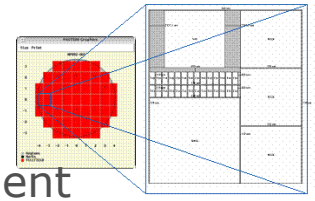


WP 1 – Assesment and definition of SMPW Technical and Management Procedures - Specific milestones (2/4)

- ELAP: ESA ELigibility APproval
  - ESA accepts to embark the design on an ESA identified run #
  - Written agreement from ESA to confirm the eligibility
  - ESA firm commitment that the customer will be on the identified run if the *"Logic Review Closing Date"* is met

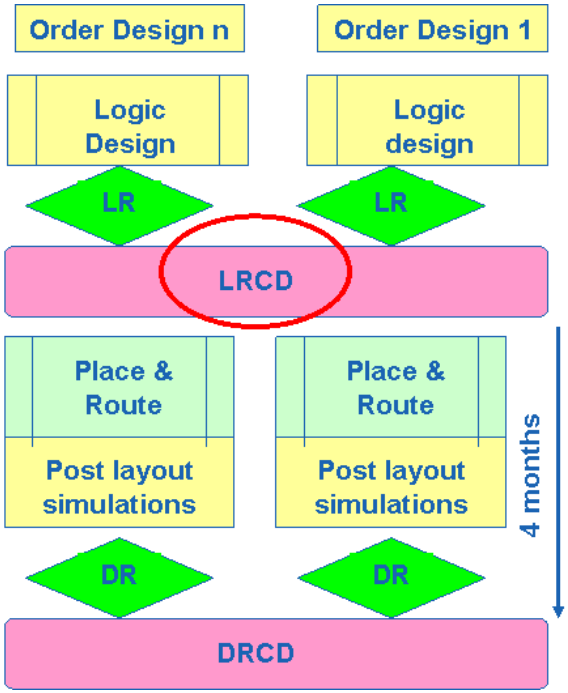


ESA SMPW

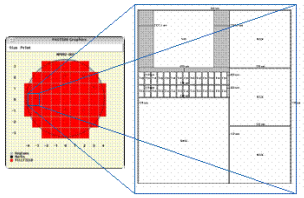


WP 1 – Assesment and definition of SMPW Technical and Management Procedures - Specific milestones (3/4)

- LRCD: Logic Review Closing Date
  - Fixed date, made public in advance
  - All Logic Reviews have to be completed
  - *"LR Closing Date"* is the latest date for confirming
    - SMPW embarking approval (ESA)
    - Commitment to embark on the agreed planning (Customer + Atmel)
  - Reticule organization is frozen
  - ESA cancellation charges apply from then onwards (on top of the standard Atmel ones)

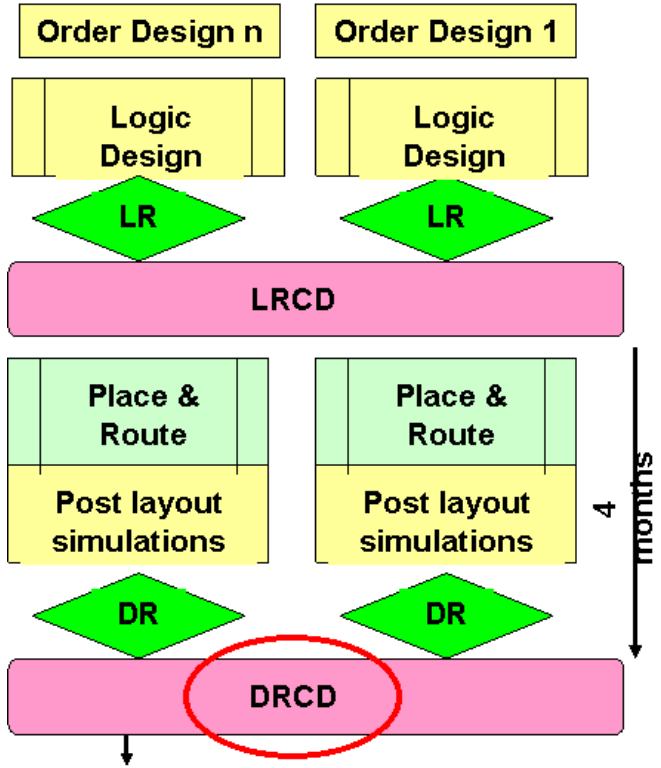


ESA SMPW



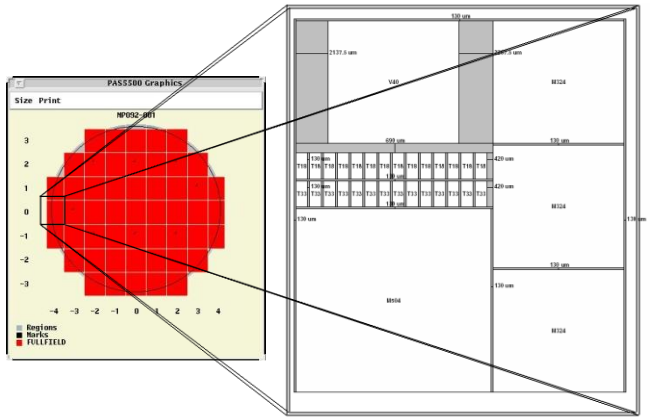
WP 1 – Assesment and definition of SMPW Technical and Management Procedures - Specific milestones (4/4)

- DRCD: Design Review Closing Date
  - Fixed date, made public in advance
  - All Design Reviews have to be completed
  - Start of the reticule and wafers manufacturing
  - 4 months between *"LR Closing Date"* and *"DR Closing Date"*



ESA SMPW

SMPW E0 Validation run

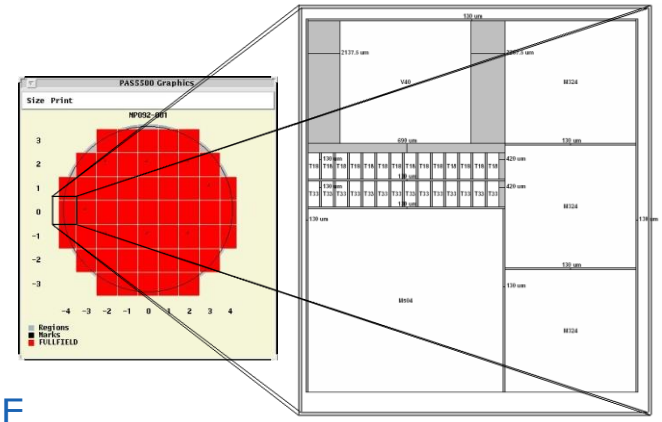


- Started in 2004

- QDMX from TAS Fr
- NPMA from Astrium Fr
- And Atmel ATC18RHA test vehicule (SEC & TCV)

ESA SMPW

SMPW run E1



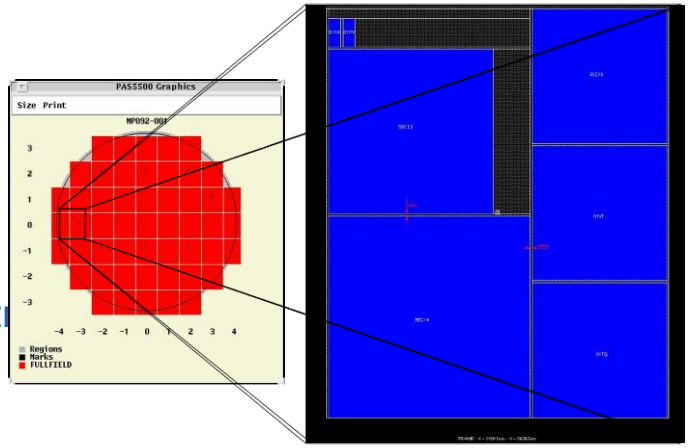
- SMPW_E1
  - 1 CUSTOMER - RUAG
  - 2 ASIC's + ATC18RHA SEC & TCV
    - 1 ATC18RHA_504 for R&D space project COLE
    - 1 ATC18RHA_324 for Flight Models production SpW-RTC
- DRCD driven by the most complex ASIC DR: December 2007
- From design to prototypes delivery: no issues linked to the SMPW procedures
- Easier SMPW management due to the fact that only one customer was involved
- REFERENCE

  SPACE SMPW_E1 RUN final report

  ADF-PL-R0993-VUL rev.2, 2008 Aug.

ESA SMPW

SMPW run E2



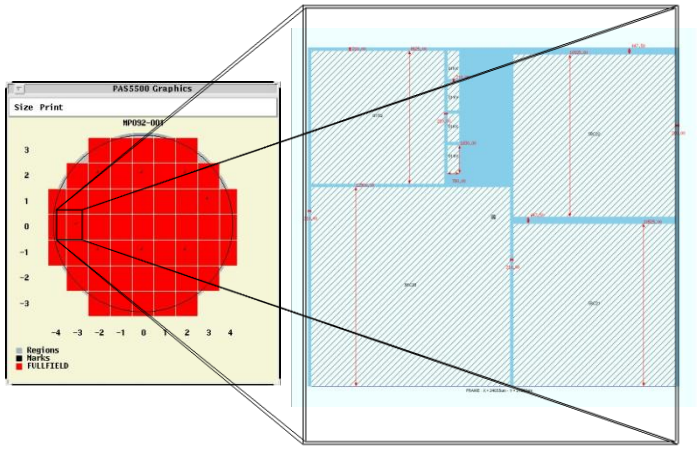
- SMPW_E2
  - 3 CUSTOMERS Astrium F, Astrium Ge, Jena Optr
  - 3 ASIC's
    - 1 ATC18RHA_504 Scoc3
    - 1 ATC18RHA_404 MDPA
    - 1 ATC18RHA_324 Apsss
    - And Atmel SEC & TCV
- DRCD: December 2008
- From design to prototypes delivery: no issues linked to SMPW procedures
- '1st at DR, 1st at probe' rule not relevant when an 'easier' ASIC than complex ones is on the same reticule
- REFERENCE

  SPACE SMPW_E2 RUN final report

  ADF-PL-R0999-VUL rev.1, 2009 Sep.

ESA SMPW

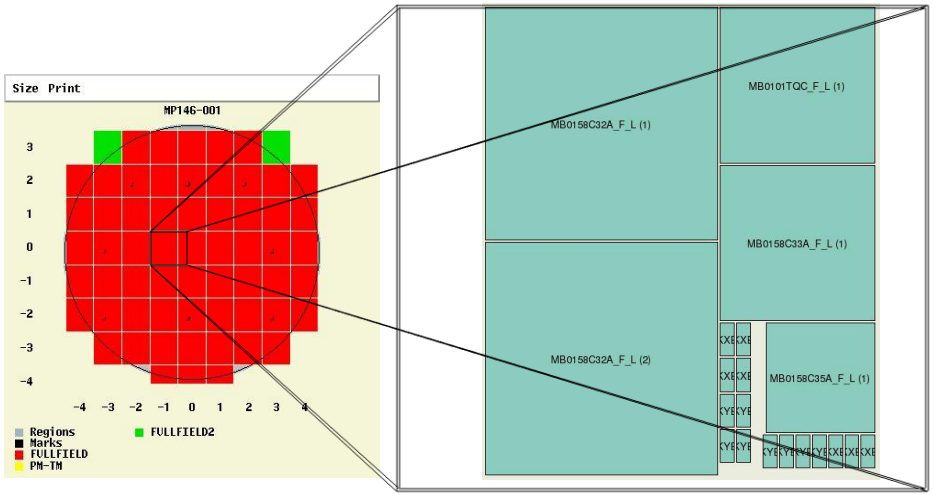
SMPW run E3



- SMPW_E3
  - 2 CUSTOMERS TAS Spain, Astrium Ge
  - 3 ASIC's
    - 1 ATC18RHA_504 FFTC
    - 2 ATC18RHA_404 Corconte, Solares
    - And Atmel SEC & TCV
- DRCD: March 2010
- From design to prototypes delivery: no issues linked to SMPW procedures
- Delay in prototypes deliveries
  - Last schedule is 10W48, 10W50 & 10W51

ESA SMPW

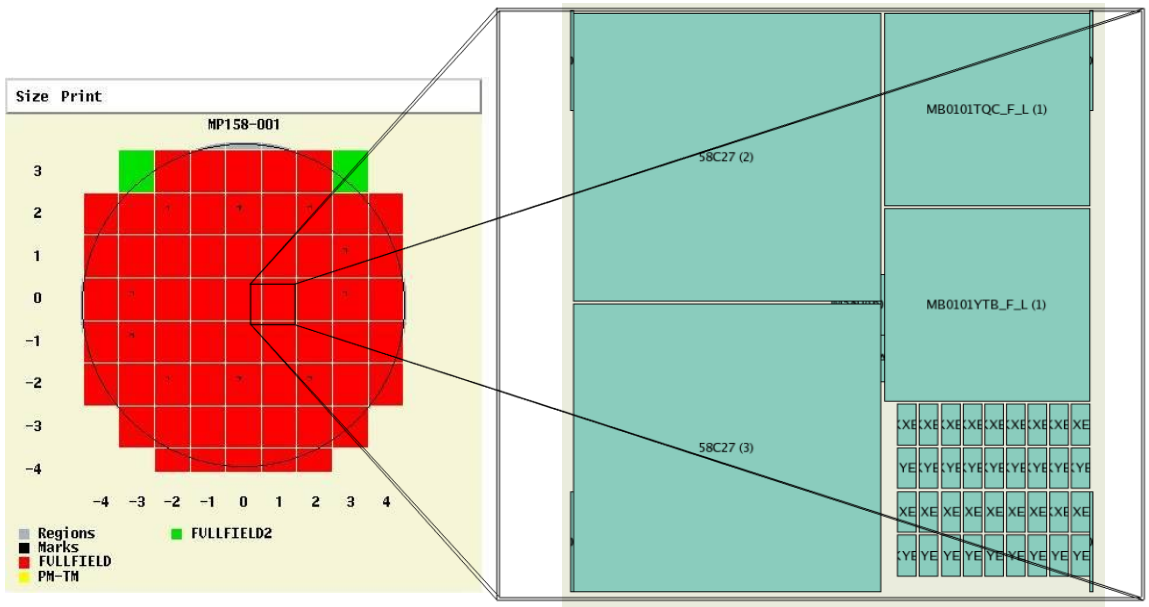
SMPW run E4



- SMPW_E4
  - TBC - 4 CUSTOMERS Astrium F, Astrium Ge, Jena Optro, Garfield
  - 4 ASIC's
    - 2 ATC18RHA_504 Cwicom, Agga4
    - 1 ATC18RHA_324 Apsss2
    - 1 ATC18RHA_216 Stapleton-Garfield
    - And Atmel SEC & TCV
- CWICOM delayed to a next run
- DRCD: July 2011

ESA SMPW

SMPW run E5

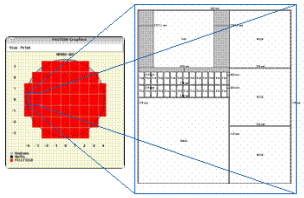


- Add-on run

- SMPW_E5
  - 1 CUSTOMER Astrium F,
  - 1 ASIC
    - 2 ATC18RHA_504 Cwicom,
    - And Atmel SEC & TCV

- DRCD: 2012

ESA SMPW Conclusion



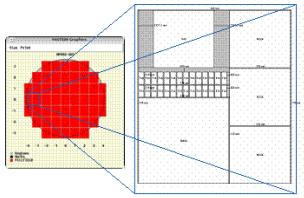
Main constraints

- Cycle times
  - Add-on work for dies assembly
  - Full cycle (compare to gate arrays)
- Fixed dates (even if we met some slippage)
  - Even for a single end-user it is difficult to synchronise 2 designs
  - Palce&Route heavily depends on design size and complexity
- Risk of cancellation if not enough candidates (2 minimum)
  - But average per run has been higher than 2

Main management difficulties

- Freeze the shot at LRCD (SMPW_E2)
- The rule '1st at DR, 1st at probe' not relevant when a 'easy asic' shares the shot with some 'complex ones'.

ESA SMPW Conclusion



14 ASICs done

- Strong collaboration with all end-users
- Strong support and overall management from ESA

Main advantages

- Access to advanced technology at lower cost
- Prototyping for R & D without FM

End-User should give their own conclusion (hoping positive!)

ESA and ATMEL considered it has been a success (to be renewed!)

To be improved: number of designs, number of yearly MPW runs