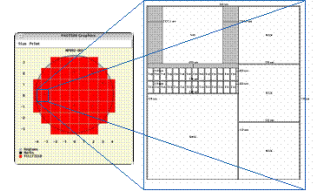


ESA/CNES meeting, 2010 Dec. 1-2nd

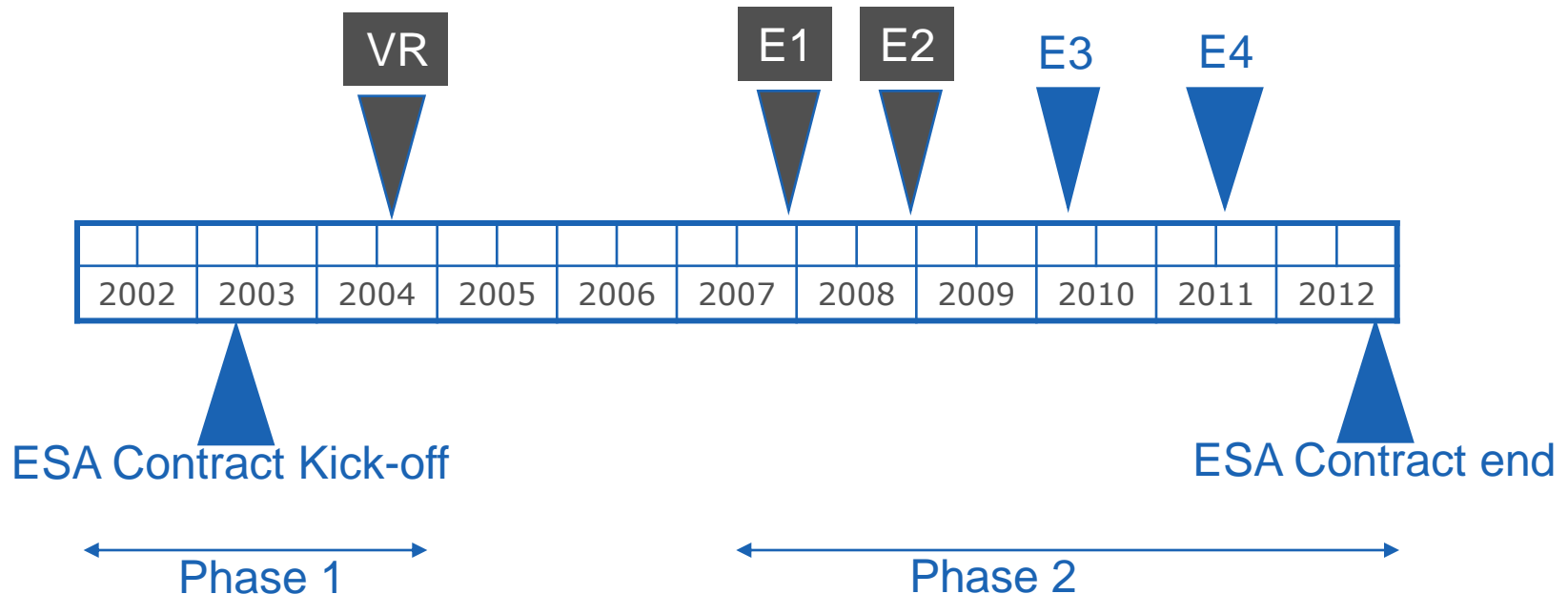
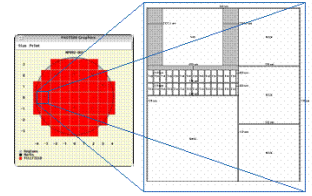
ESA SMPW Objectives



- 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

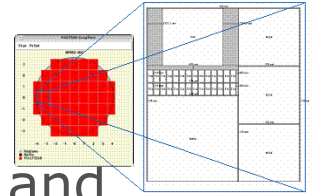
ESA SMPW

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

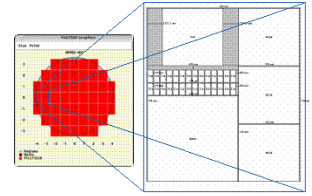
- STATUS: **COMPLETED**

- REFERENCE

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

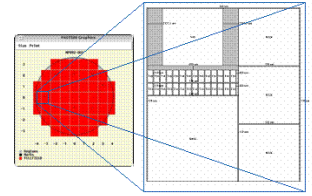
SMPW Validation run report ADF-PL-R0810-VUL, 2005 May

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

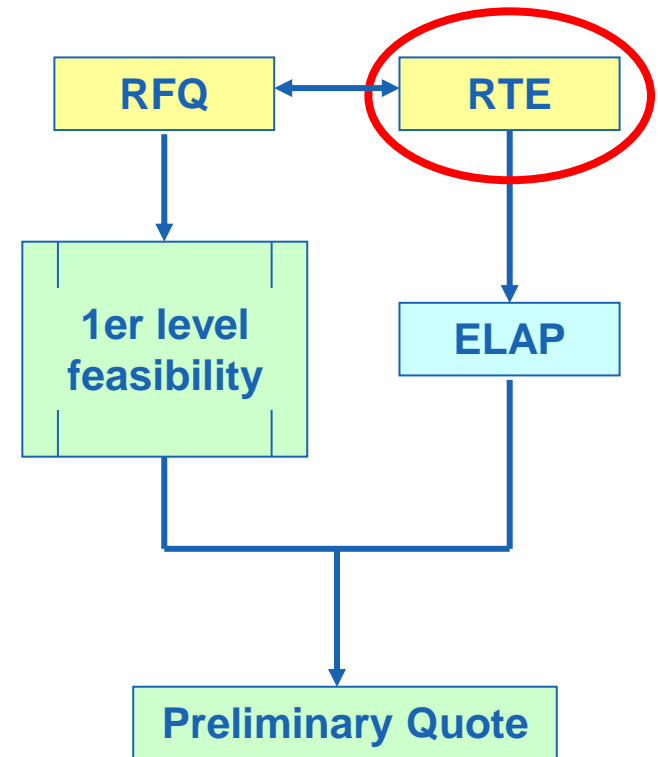
ESA SMPW



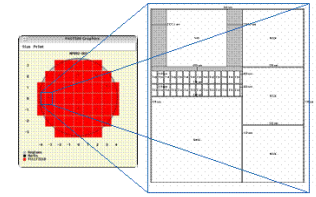
WP 1 – Assessment and definition of SMPW Technical and Management Procedures - Specific milestones (1/4)

- **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

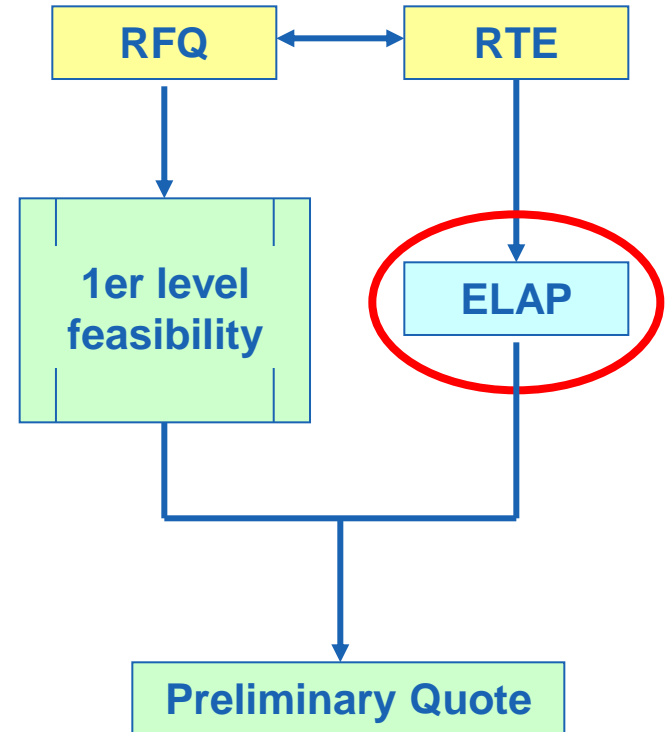


ESA SMPW

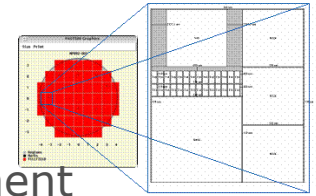


WP 1 – Assessment and definition of SMPW Technical and Management Procedures - Specific milestones (2/4)

- **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

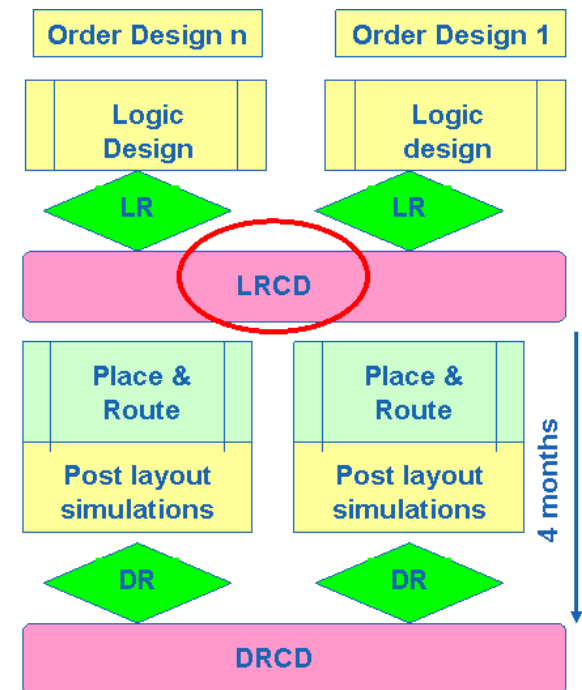


ESA SMPW

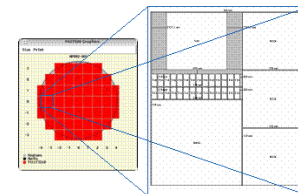


WP 1 – Assessment and definition of SMPW Technical and Management Procedures - Specific milestones (3/4)

- **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)



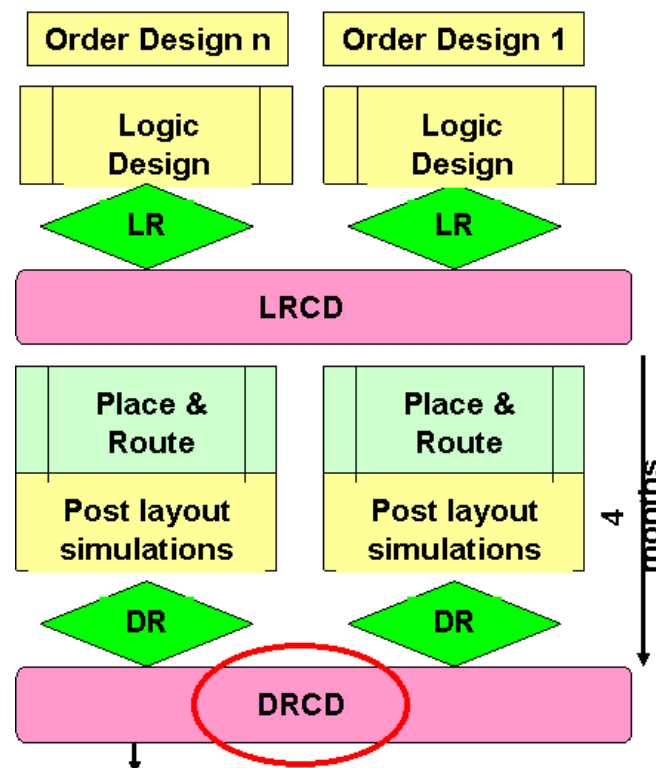
ESA SMPW



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

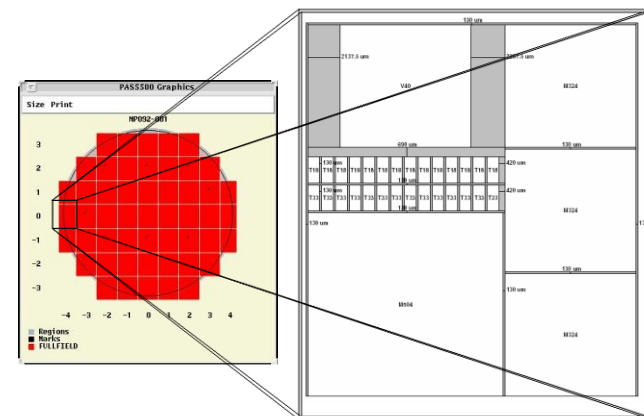
- **DRCD: Design Review Closing Date**

- 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"



SMPW E0 Validation run

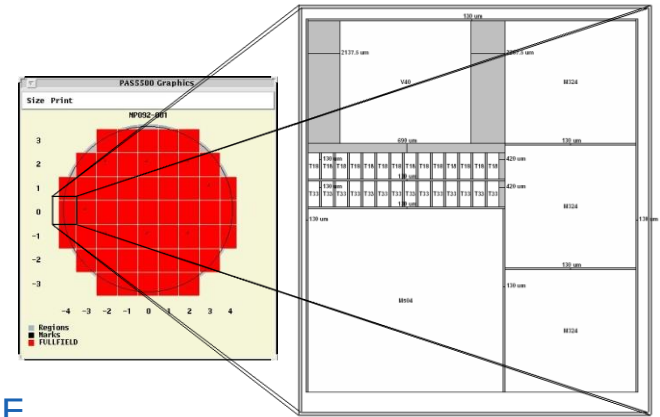
- Started in 2004
- QDMX from TAS Fr
- NPMA from Astrium Fr
- And Atmel ATC18RHA test vehicle (SEC & TCV)



ESA SMPW

SMPW run E1

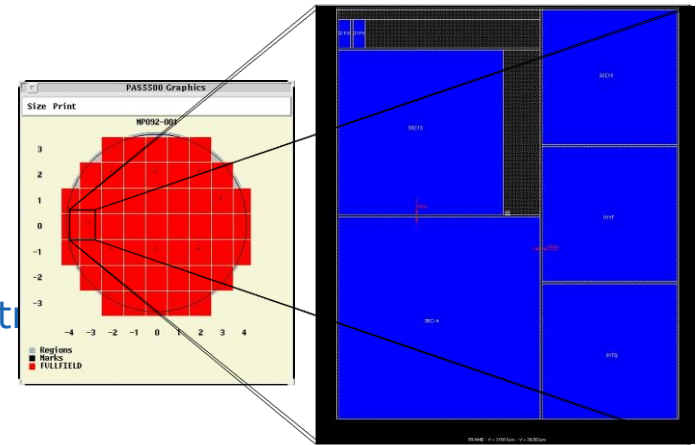
- SMPW_E1
 - 1 CUSTOMER - [RUAG](#)
 - 2 ASIC's + ATC18RHA SEC & TCV
 - 1 ATC18RHA_504 for R&D space project [COLE](#)
 - 1 ATC18RHA_324 for Flight Models production [SpW-RTC](#)
- DRCD driven by the most complex ASIC DR: December 2007
- From design to prototypes delivery: no issues linked to the SMPW 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

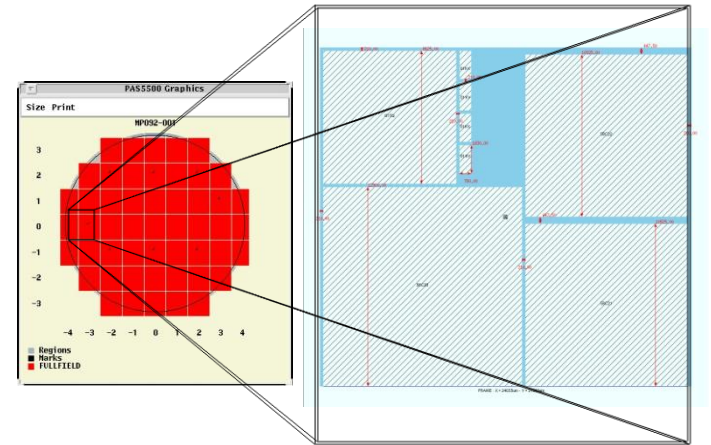
- SMPW_E2
 - 3 CUSTOMERS [Astrium F](#), [Astrium Ge](#), [Jena Opt](#)
 - 3 ASIC's
 - 1 ATC18RHA_504 [Scoc3](#)
 - 1 ATC18RHA_404 [MDPA](#)
 - 1 ATC18RHA_324 [Apsss](#)
 - And Atmel SEC & TCV
- DRCD: December 2008
- From design to prototypes delivery: no issues linked to SMPW procedures
- '1st at DR, 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

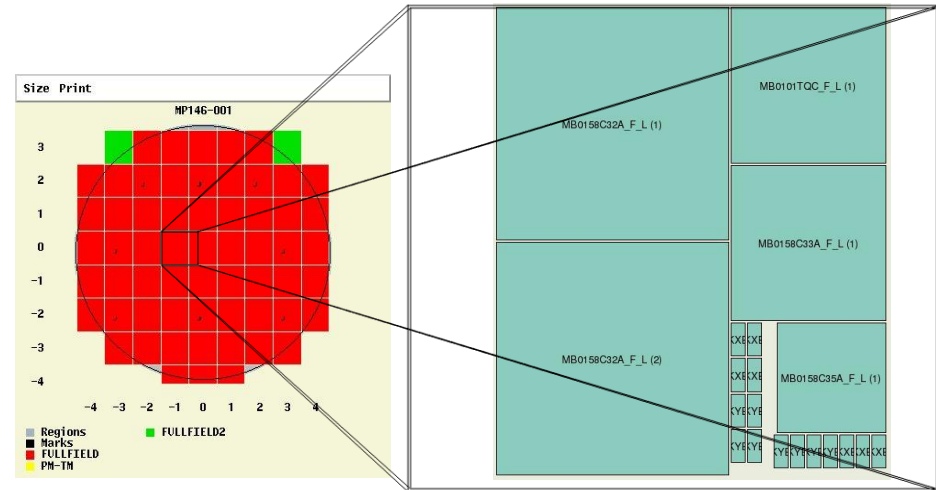
SMPW run E4

- SMPW_E4

- TBC - 4 CUSTOMERS [Astrum F](#), [Astrum 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

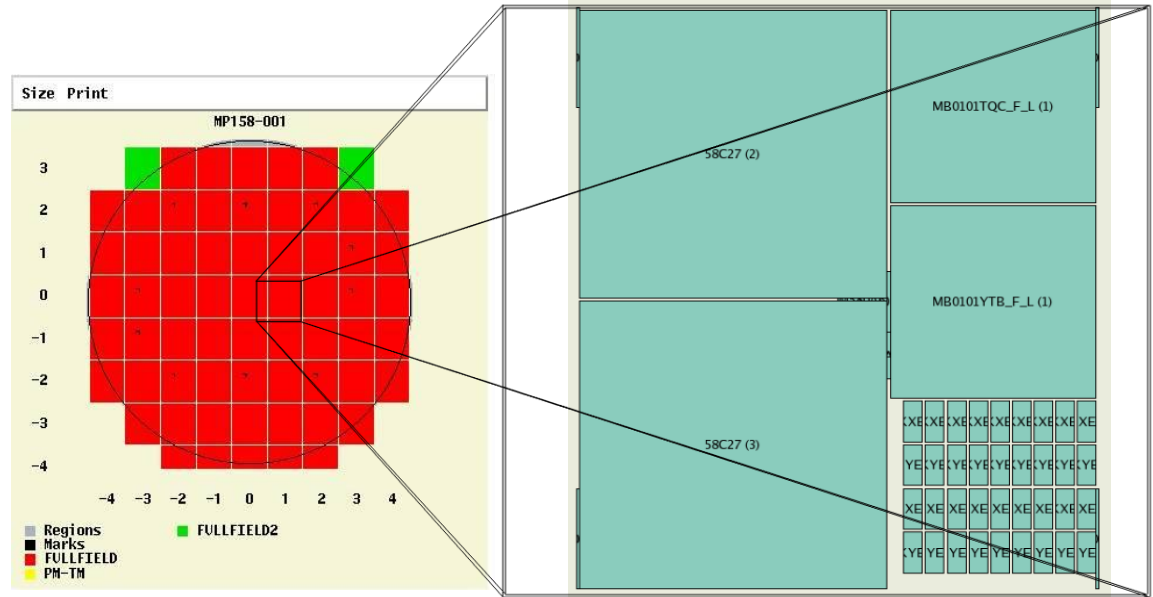
- DRCD: July 2011



ESA SMPW

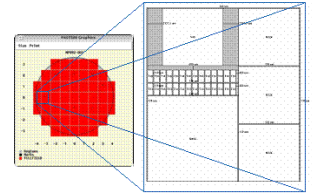
SMPW run E5

- Add-on run



- SMPW_E5
 - 1 CUSTOMER [Astrium F](#),
 - 1 ASIC
 - 2 ATC18RHA_504 [Cwicom](#),
 - And Atmel SEC & TCV
- DRCD: 2012

ESA SMPW Conclusion



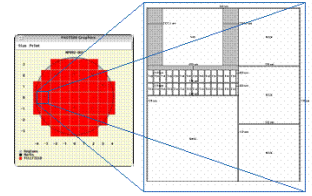
Main constraints

- 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
 - Place&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



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