Seeing trough the clutter

Development of the Visby class surveillance radar

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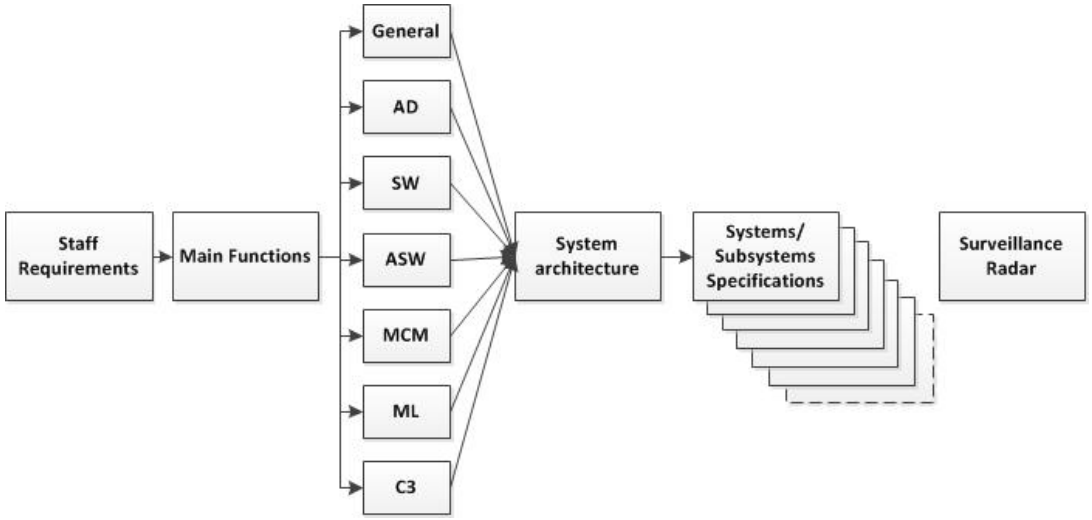
The initial process

- Requirements
  - Input was the Staff requirements for the Visby class Corvette
  - Analysis of operational requirements gave the main functions
  - A architecture was defined
  - Breakdown to systems/subsystems level of requirement



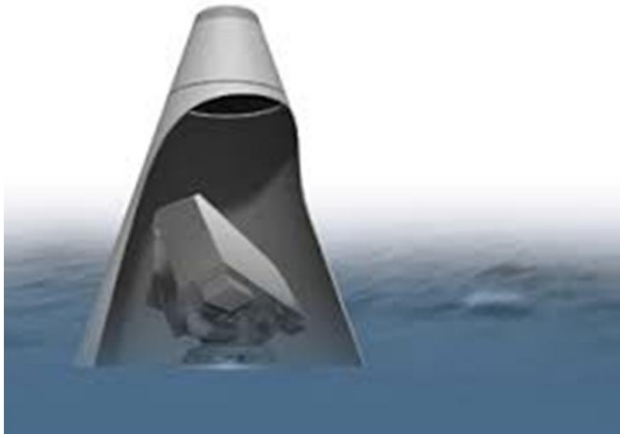
  - Further analysis gave a time budget for each main functions
  - Technical/functional systems specification based on he tactical scenarios, earlier experiences and the operational environment
  - This systems specification was not clear every aspect, rather quite fuzzy
  - A RFQ was sent to the industry

Prerequisites

- There was a prototype of a Giraffe AMB for an air defence system in development
- High demands for simultaneous processing (Air, Surface, Jammer, Navigation, LPI)
- Earlier concept was depending of several radars for covering the envelop of functions, that was not a solution due to the Visby class Corvette design
- Weight and space had to be kept minimal
- There was a limited fixed budget

Pre-contractual cooperation

- After a time of reading and initial analysis at Saab the discussions started:
  - Scrutinization of each and every requirement
  - Trying to find technical solutions for the requirements
  - Alternative solutions for requirements that were impossible to match or where even breaking the laws of nature
- After approximately two years we had a contractual specification that was to the standard of SMART
  - Specific
  - Measureable
  - Achievable
  - Relevant
  - Time-bound
- Milestones
  - Contract 1998
  - FAT 2002
  - SAT 2005*
  - Major upgrade 2014



Solution

- Multifunction – one radar had to be able to carry out all the surveillance functions
- Adaptation – both operator initiated and automatical
- Multibeam allow more volume coverage per revolution (increase flexibility)
- Simultaneous processing was solved in parallel or with a sequential (interlaced) handling of functions
- High resolution in defined sectors
- Extreme low sidelobes in azimuth (>100 dB)
- Mulitbeam, surpression of lower sidelobes in elevation close to the horizon
- Adaptive Clutter maps – Trade of between the size of a cell and the speed of the ship
- Extreme high quality of the transmitted signal results in extreme MTI (>50 dB)

Verification and testing

- Challenge the clutter situation in littoral with a moving platform
- The clutter situation is continuously changing
- Testing was performed at Saab test site, in a coastal environment and with moving platform in the littoral

- A number of iteration in the design (clutter maps, radar modes, CFAR function, Thresholds i.e.) due to the littoral environment

Conclusions

- Knowledge and experience of the operational environment
- Close cooperation
- Progressive development
- Extensive testing