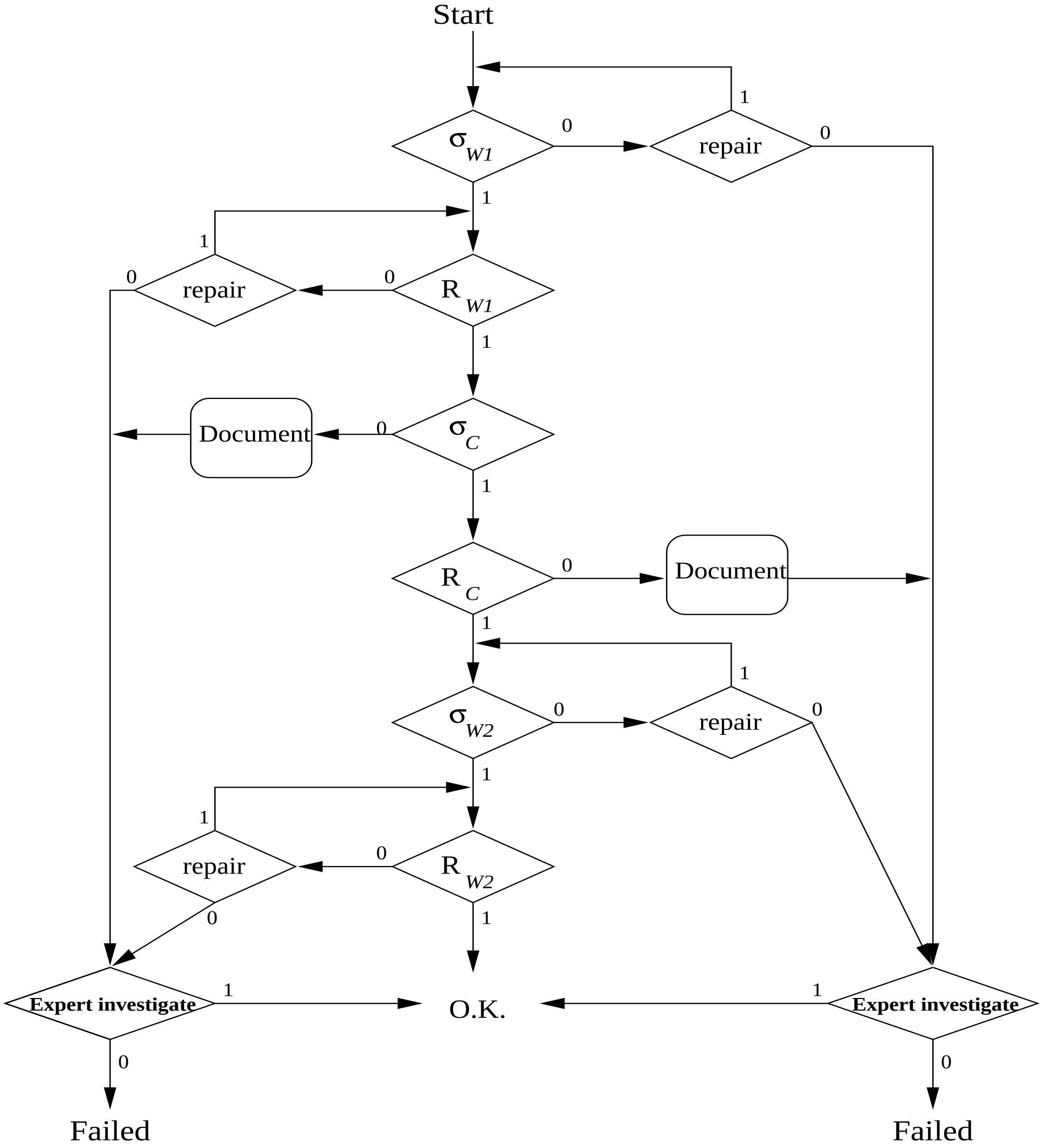
HEC modules acceptance, Signals and noise

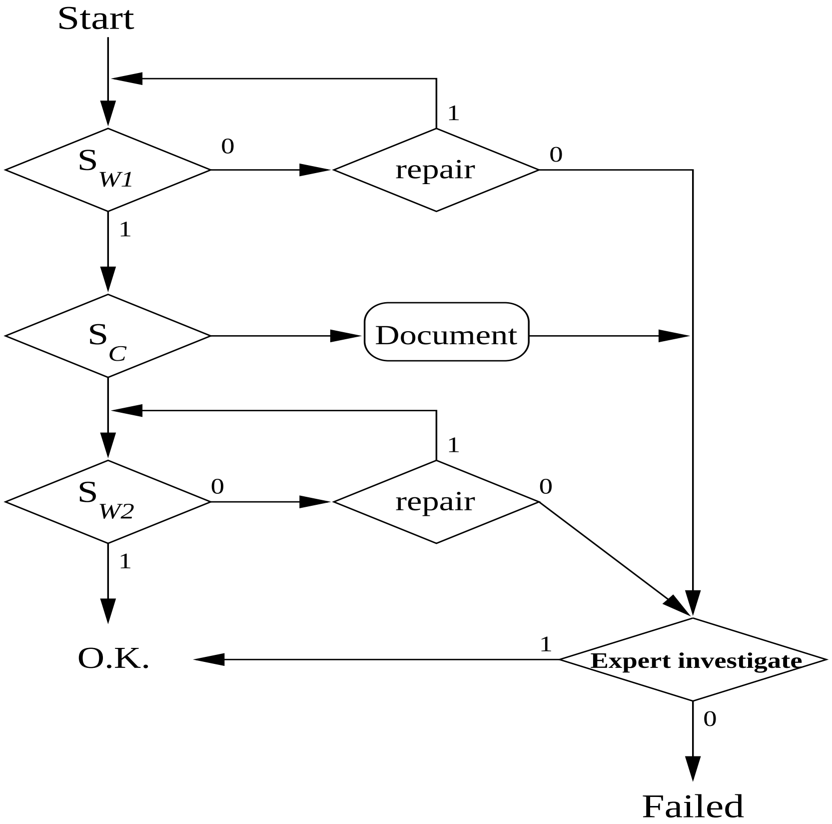
Tests flow

There are three tests, which tell us about module quality. All tests are examining all channels, one by one.

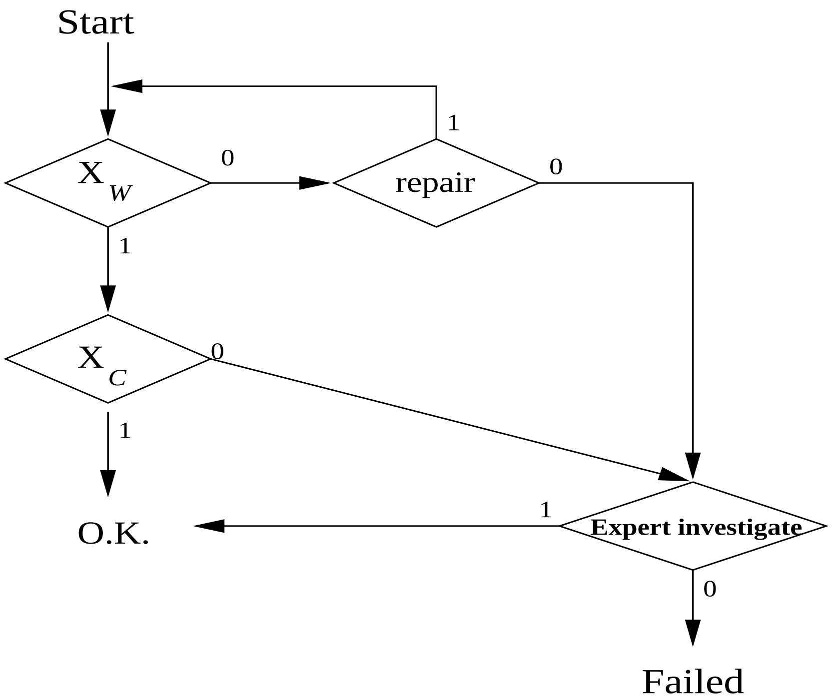
- **Noise.**
The parameters in question are σ and $R = \frac{\sigma_{beforeHV}}{\sigma_{duringHV}}$. We have three measurements - in cold (C), in warm before (W1) and in warm after (W2)



- **Shape.** The parameters in question are maximal residua (S) between measured and reference shape. Again three measurements.



- **Xtalk.** The parameters in question are amplitudes of X-talk signals We have two measurements - in cold (C) and in warm before (W)



0. TDC & wrap check
1. Cable check
2. Quick signal & noise
3. Cable check
4. Quick signal & noise
5. Small data taking
6. Noise run before HV $\rightarrow \sigma_{W1}$
7. Noise run during HV $\rightarrow R_{W1}$
8. Full warm data taking $\rightarrow$ warm(1) gains, shape
9. X-talk $\rightarrow X_W$
10. Analysis of 8.

$\rightarrow$ Cooling, filling

11. Quick signal & noise
12. Small data taking
13. Noise run before HV $\rightarrow \sigma_C$
14. Noise run during HV $\rightarrow R_C$
15. Full cold data taking $\rightarrow$ cold gains, shape
16. X-talk $\rightarrow X_C$
17. Repeat Small data taking
18. Analysis of 15.

$\rightarrow$ Warm up

19. Quick signal & noise
20. Small data taking
21. Noise run before HV $\rightarrow \sigma_{W2}$
22. Noise run during HV $\rightarrow R_{W2}$
23. Full warm data taking $\rightarrow$ warm(2) gains, shape
24. Analysis of 23.

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25. Final decision about signals and noise tests

Documentation

- **Standard**
  Produced for each module. Printed out at the end of test.
  - List of passed tests, with dates, test crew names and possible comments.
  - Table with the following items for all channels:
    * Ch. id — Mod,Pad,ADC
    * Noise — σ_{W1},σ_C,σ_{W2}
    * Noises ratio — R_{W1},R_C,R_{W2}
    * Gains — g_{W1},g_C,g_{W2}
    * Cold shape residua — S_{max},S_{min}
    * Xtalk — X_W,X_C — for four neighbouring channels

    The second table with same layout will contain the 0 or 1 to indicate if the item passed the test or no
  - Pictures with σ_C, g_C and T_{peak} distribution over all channels
- **Channels failed in some tests**
  Produced for the bad channels, all documentation is produced, independently of which tests was failed.
  - Noise — pedestal distribution and K(t) pictures
  - Shape — Profile plots of shape and reference shape in one picture and residua plot
  - Xtalk — Profile plots of source signal in warm and cold, profile plots of xtalk signal in warm and cold. For all profiles the amplitude fitted, and noise correlation between source and xtalk channel

Test-beam additional test

Propsed is the additional "test" for modules in the test beam load.

- Comparison of particle signal shape with reference one. The reference shape will be produced in the Model 2000.
  - electrons — in 1. and 2. segment, for "standard" points
  - pions — in 2. and 3. segment for channels $\frac{\Delta E}{E} < 5\%$
  - muons — all accessible channels
- Needed is:
  - MC results for sharing of energy between channels for all impact points
  - Some "standard" routines for hec_adc code for correct extraction of the profiles for all particle types