

*“Educated guess physics lists
for geant4 hadronic physics”*

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What does it need to make an “educated guess”

- Sufficient richness in modeling
- A user base, that is willing to iron things out (I.e. beta testers)
- Experience in the various areas of application.
- Sample use-case realizations

- ... Funding ... support ... time ... effort ...

The starting point

- It is well recognized since quite some time that writing a good physics list is no trivial, in particular when hadronic physics is involved.
- It is nice to be able to exploit the full power in the flexibility and variety of hadronic physics modeling in geant4, but being forced to do so is not what we want.
- It is also nice to have the physics transparently in front of you and be able to exploit it in the best possible way, but being forced to understand it all is (very understandably) not what people want, either.

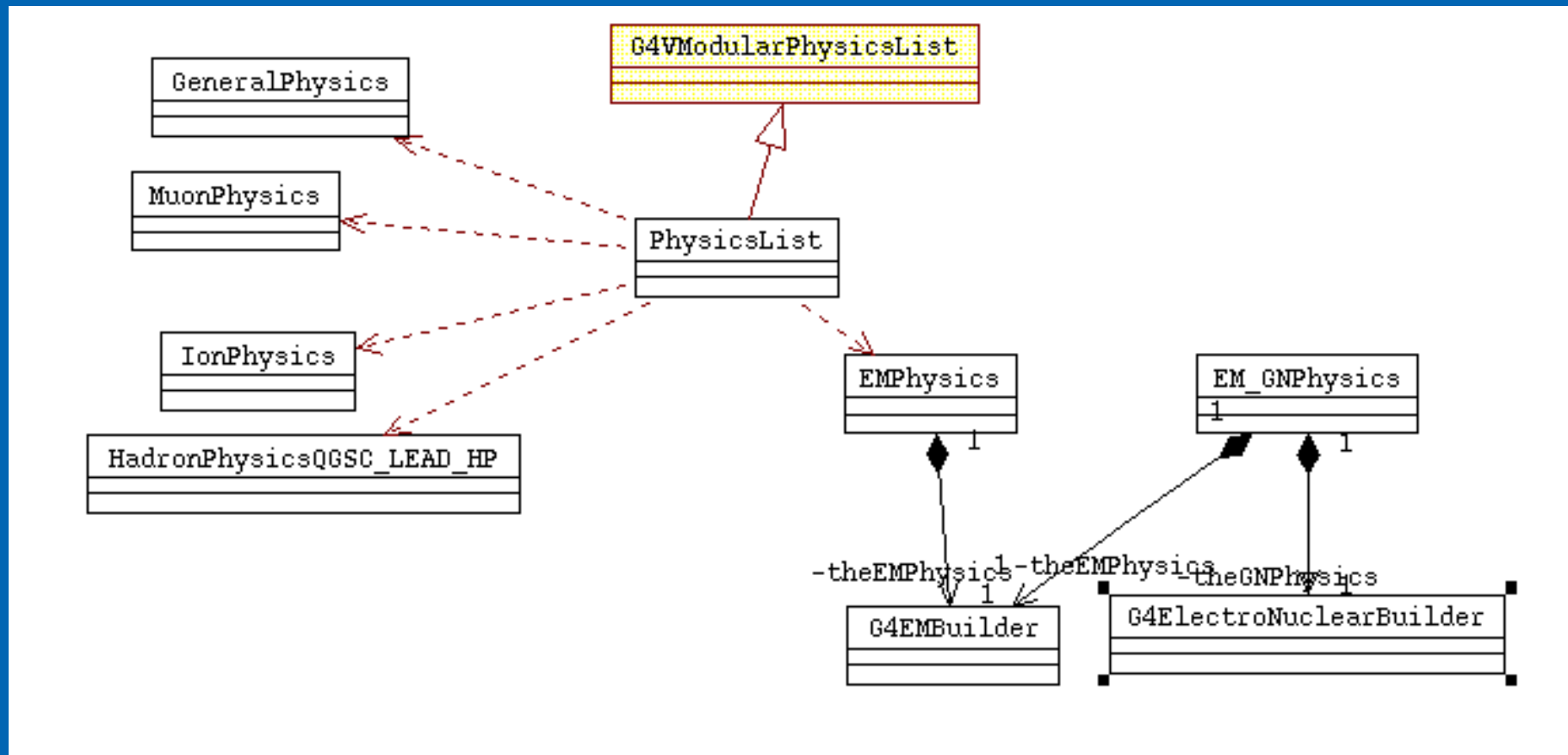
Because of this

- We have systematically accumulated experience with various combinations of cross-section and models over the last years.
- Today we can provide a set of physics lists institutionalizing this experience.
- Publishing them to the general audience was one of the main milestones of the hadronic working group for 2002.

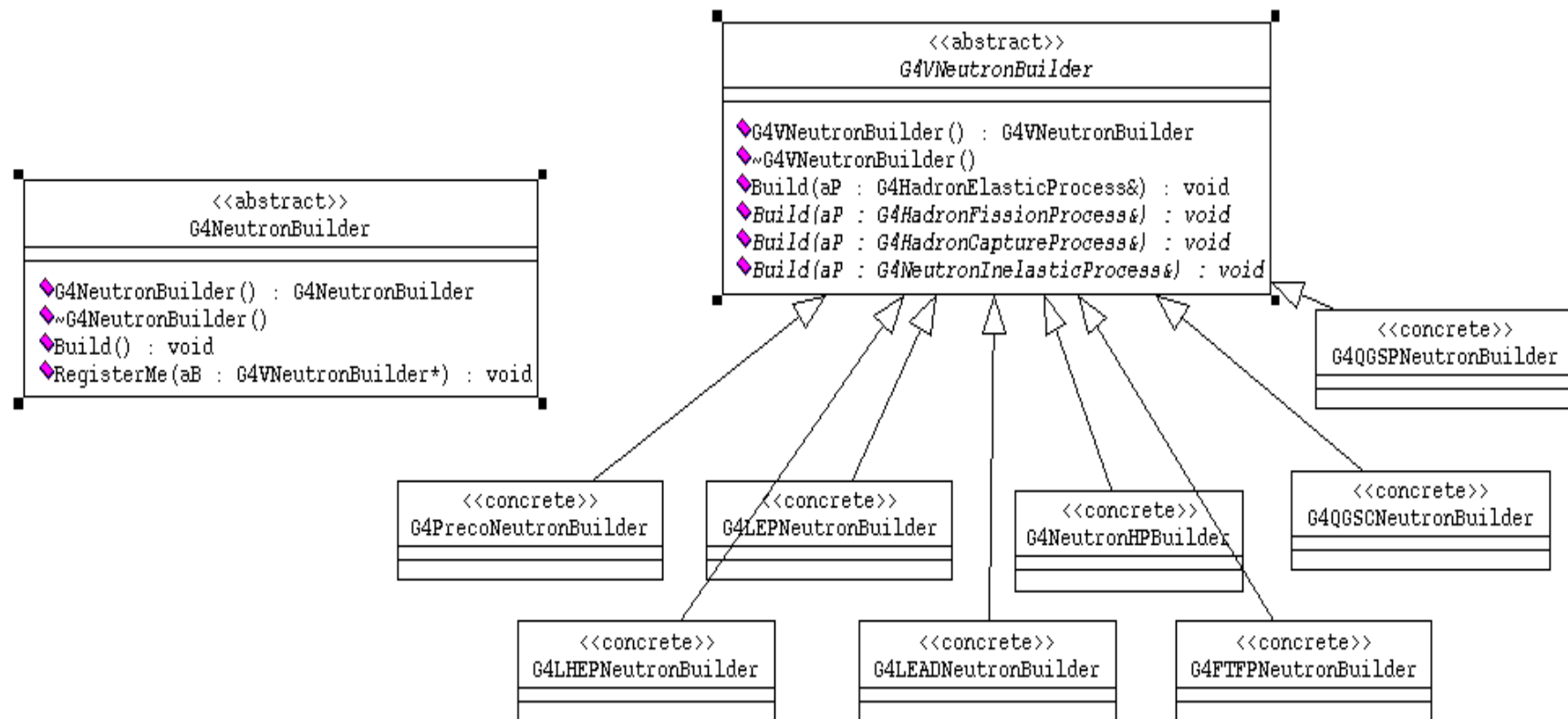
Mission statements

- Give an 'educated guess' that can be used as starting point by any user and/or give meaningful alternatives for physics lists for the various use-cases of hadronic physics.
- Provide a brief description of the modeling used in the different physics lists.
- Find a natural organization for the verification/validation results, so people can find the part of the information they are interested in; whether they do calorimeter design or neutron dosimetry.
- Provide for areas where users can contribute their findings.
- Provide a distribution mechanism for both physics lists and verification results.
- Make physics lists source code more readable.

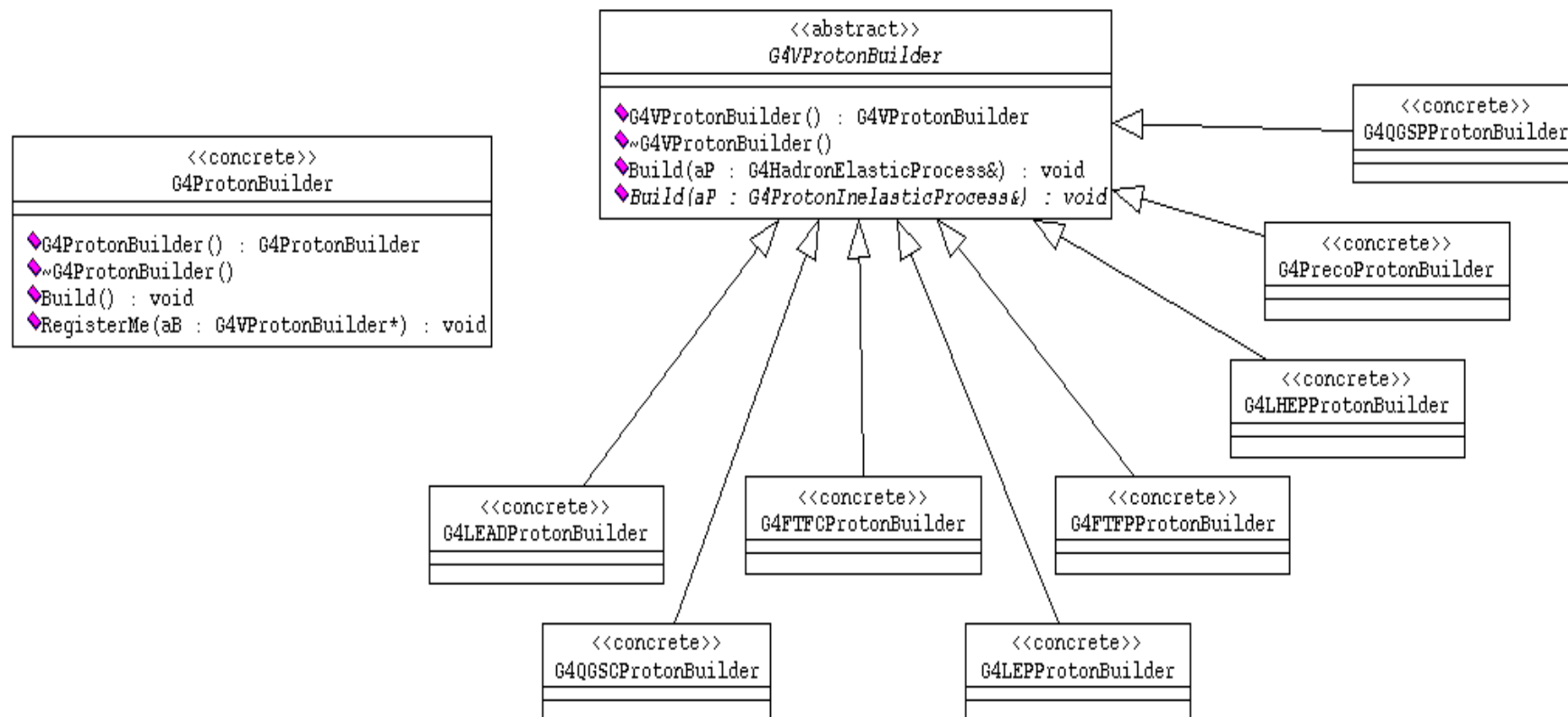
Design – an extension of what I had proposed during one of the last workshops, and Hisaya had realized.



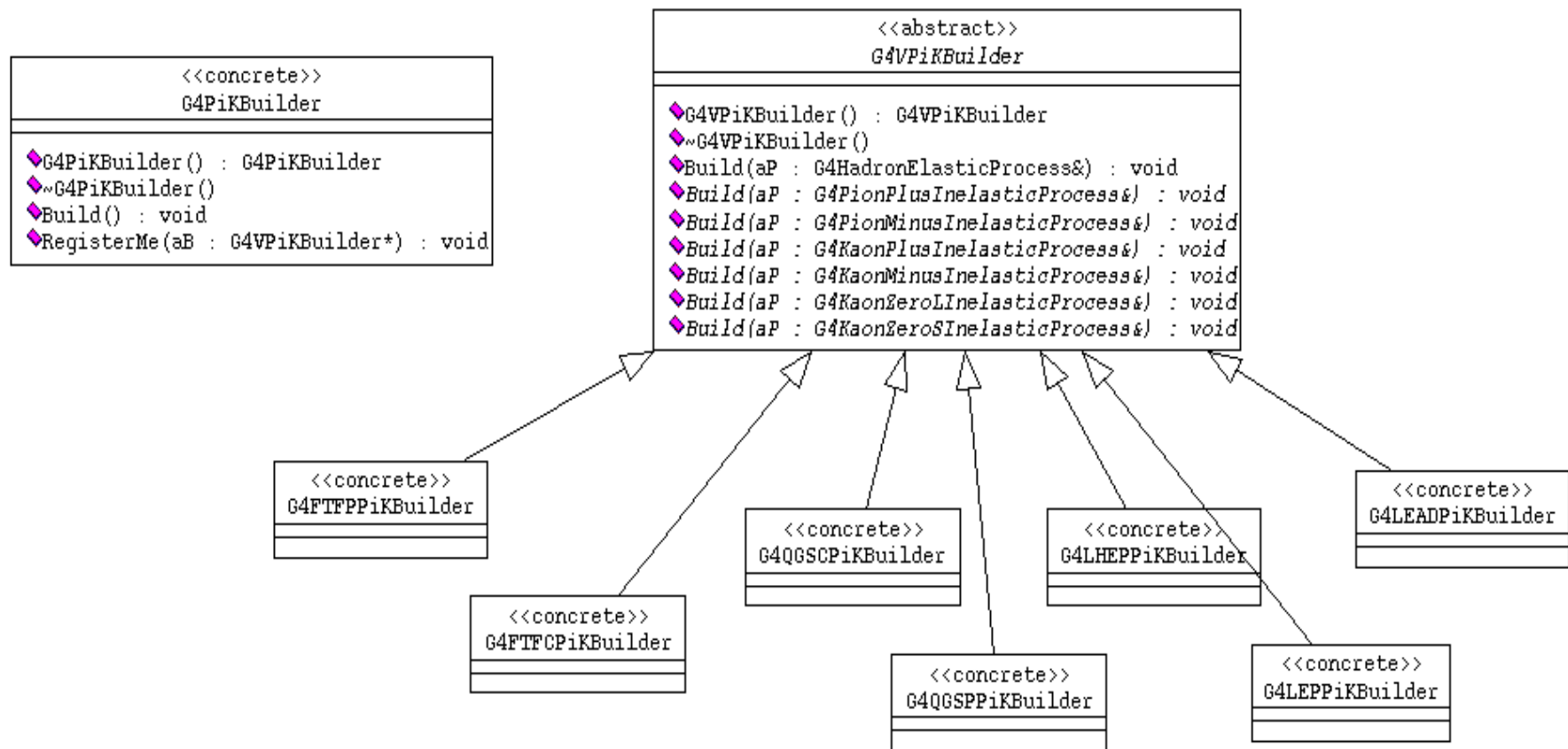
Design

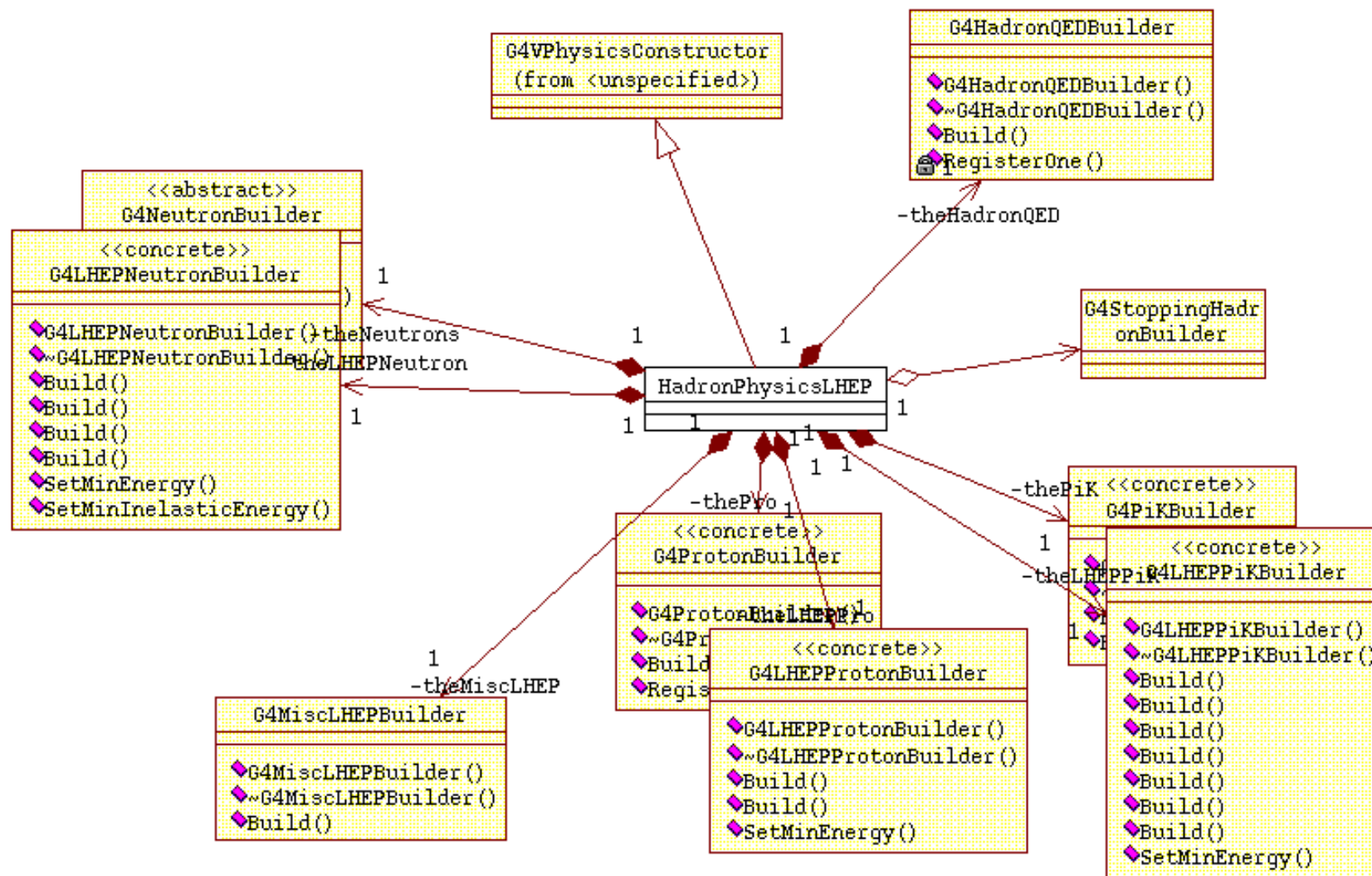


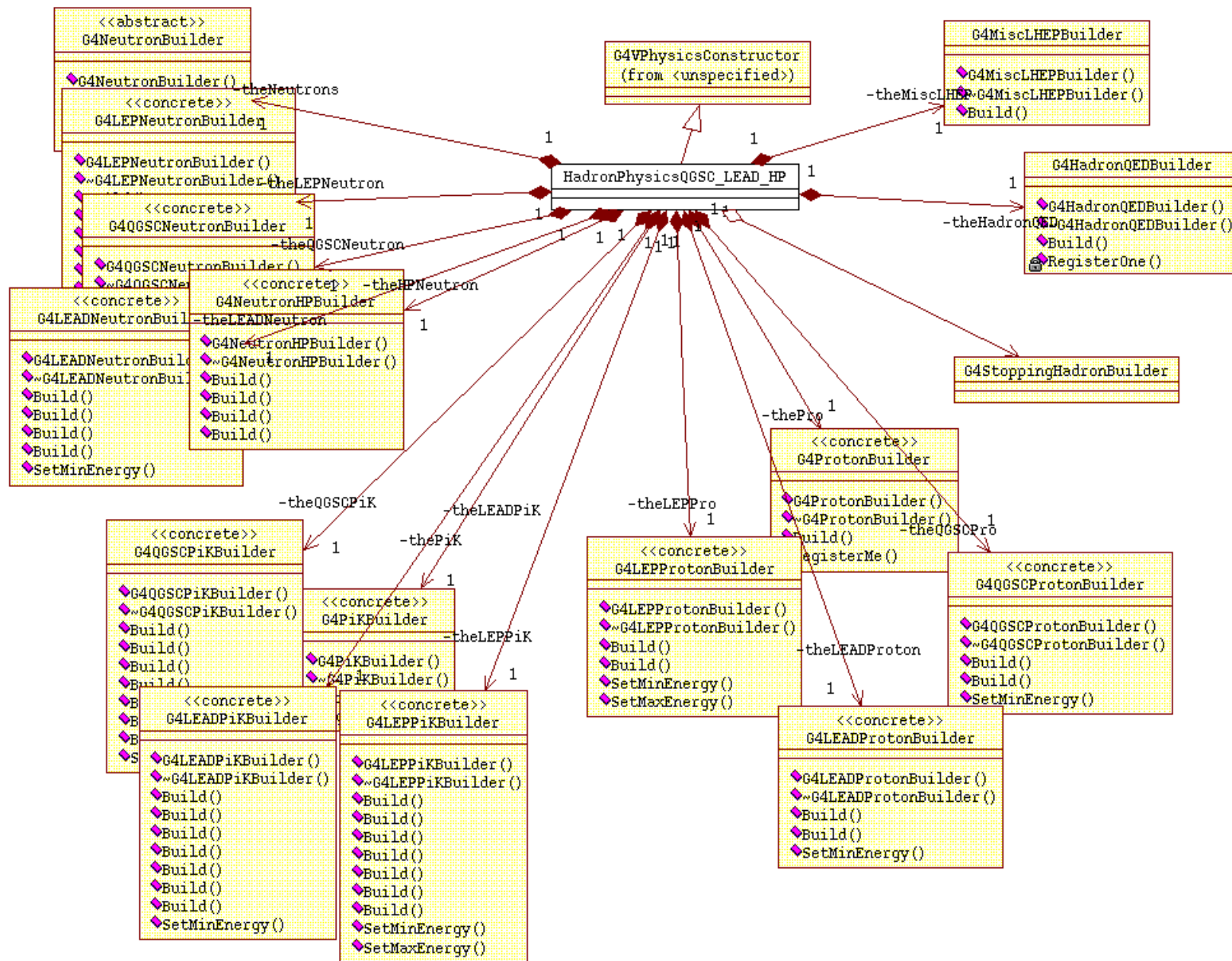
Design



Design







Now, what does this mean ?

- Complex problems need structured solutions !
- There are 5 levels of implementation framework.
- In the builders, we have collapsed these to level 1 and/or level 2 complexity.

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- Any user can now
 - Just pick a physics list from the '*menu*'.
 - Aggregate his own cocktail from limited complexity of the builders
 - Use all 5 framework levels with their full power.
 - ➔ A structured reduction in the level of complexity exposed to our users.

The WWW pages – a small demo.

- We go to:
 - <http://cmsdoc.cern.ch/~hpw/GHAD/HomePage>

Areas of usage considered

- Goto the physics lists page.

Code samples

- Go to the physics list page.

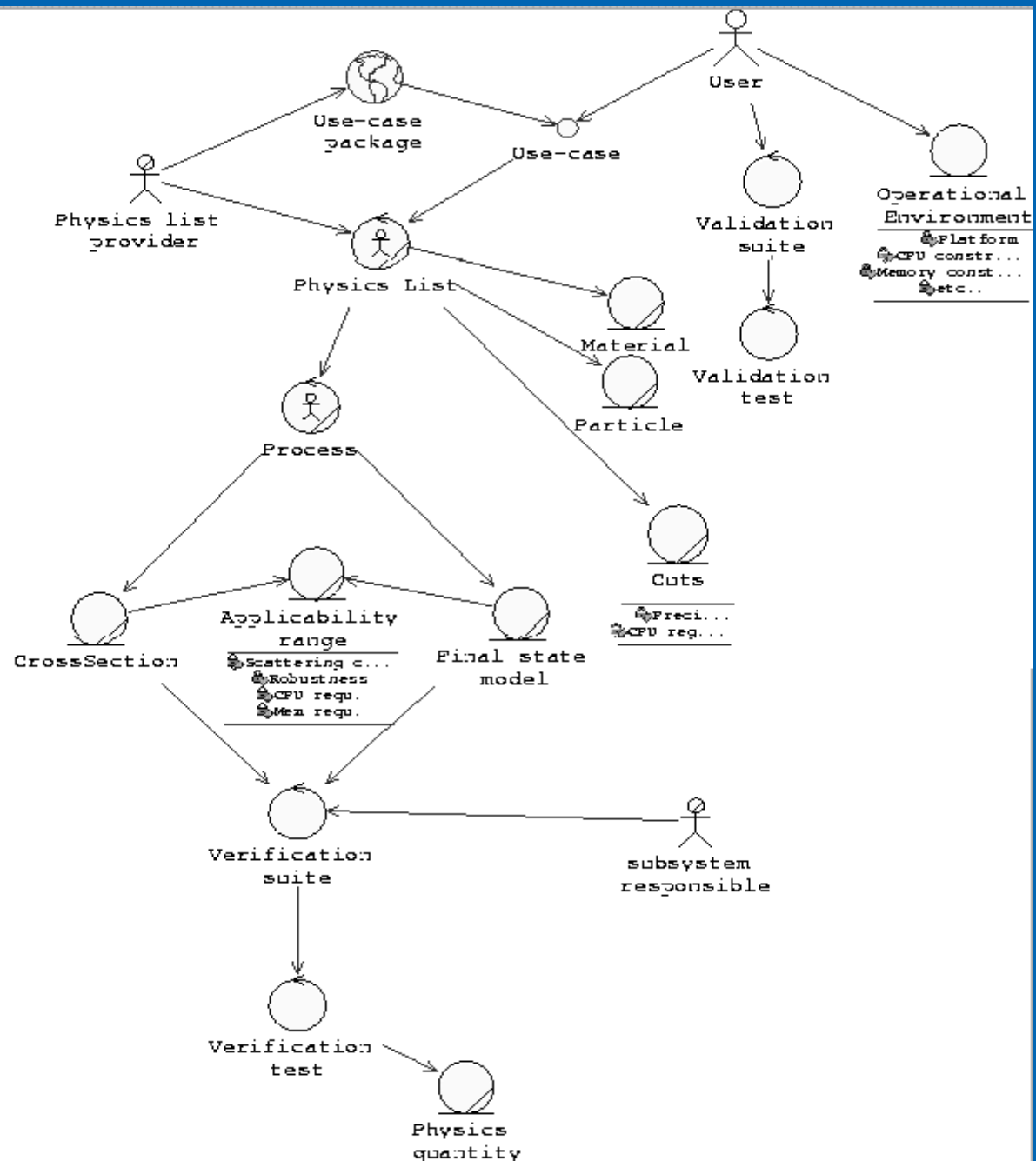
A non trivial effort

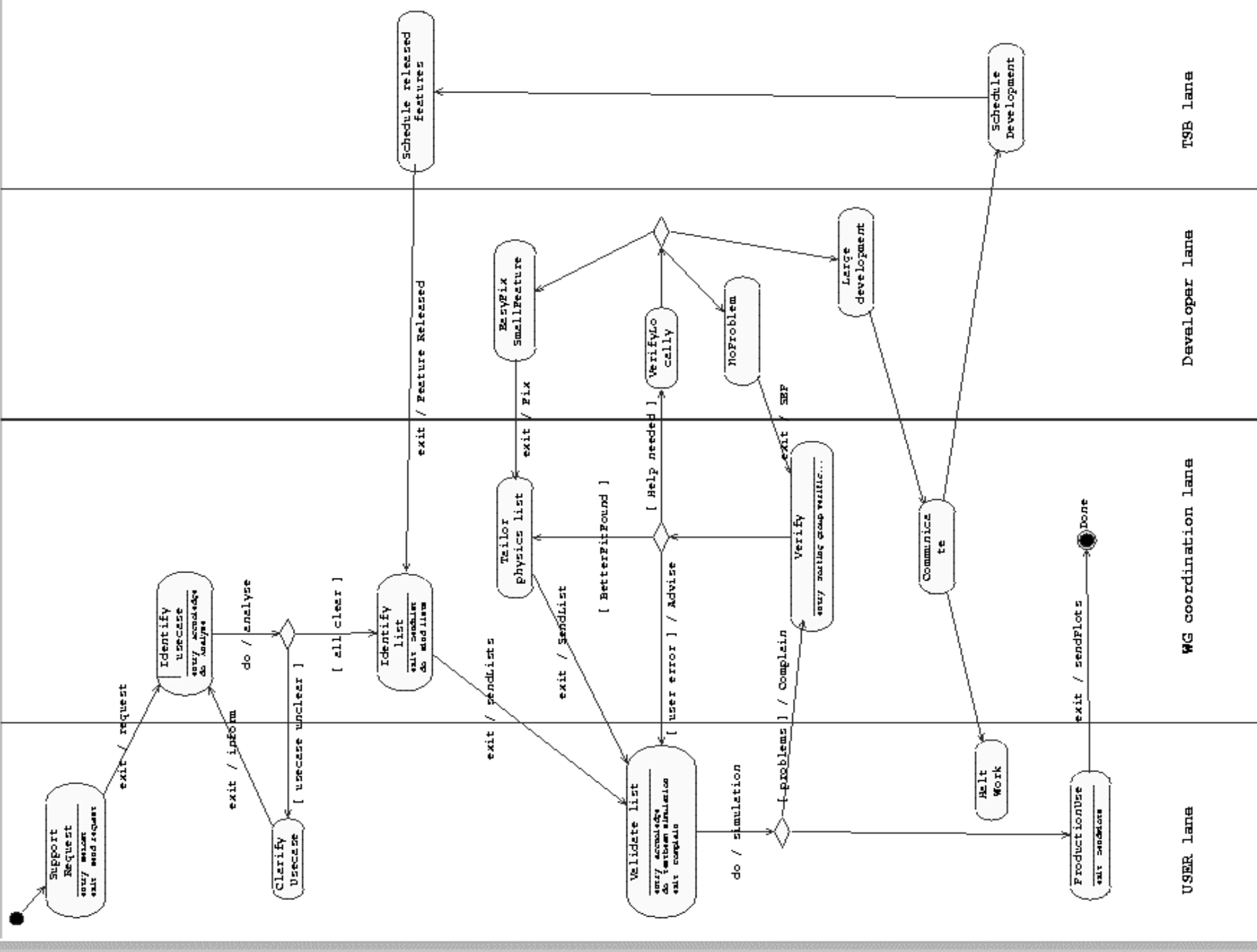
- We support 14 use-case packages
- We support 16 physics lists
- They comprise 74 classes
- Their implementation needed 8740 lines of code (comments *discounted*)

User feed-back

- Verbatim cut and paste from some of the mails...
 - “So, to make a long story short: very USEFULL. As well, I like the idea of distributing and organizing the information through web pages.”
 - “There are just a few obvious mistapes, especially your name ‘J.P. Wellisch’.
 - “Thank you for this site. It is really useful.”

The support process – static view





USER lane

WG coordination lane

Devaloper lane

T9B lane

Outlook

- Much, very constructive discussions during the workshop.