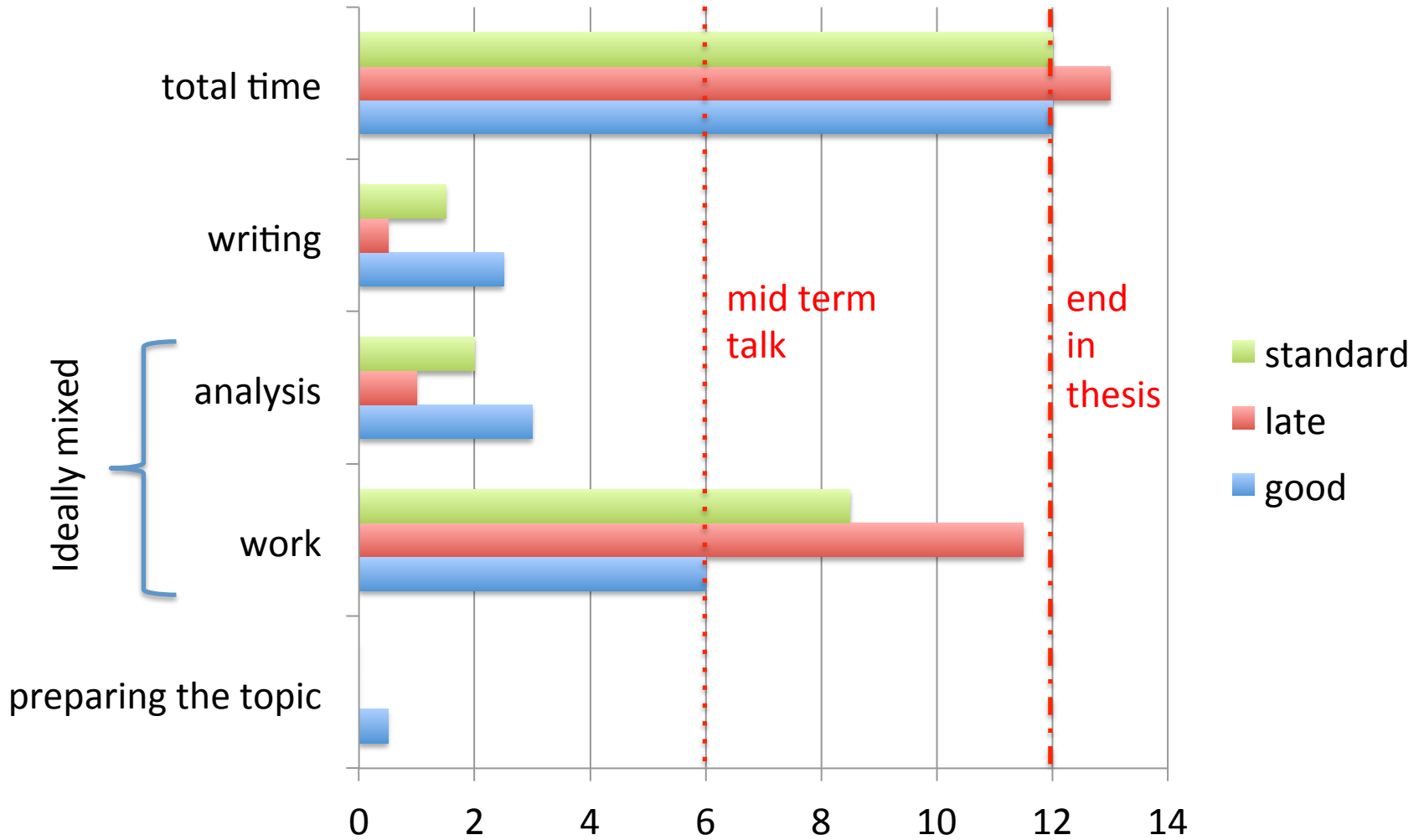


# How to get started with a master thesis ?!?!

Some tips mainly from:

- Personal experience
- Supervision of about 10 diploma thesis
- 15 years of working with physics students

# The master time



# Preparing the work


- The more you think in advance, the more you understand
- The more you understand, the faster you do the right thing
- The faster you do the right thing, the less time you waste
- The less time you waste, the highest are the chances to

BE DONE IN TIME

→ Think in advance

# Preparing the work

- Understand the physics question you are asked  
Typically 1 physics question in 1 master/diploma,  
2 questions in 1 PhD
- Take time to understand the “state of the art” of this field  
find out what to read, ask questions, demand a clear structure ...  
remember this is your **introduction** (should be written in first 2 months)
- Ask yourself where do “holy” numbers come from  
(the light yield of the system is ..., the energy resolution wanted is ...,  
the dynamic range needed is ..., the signal duration is ... → WHY ??)



Get active  
it's YOUR  
thesis

→ This is the goal of our test exercise: the first 2 weeks of your master work !

# Work and analysis

## Minimize time wasted in misunderstanding / wrong directions

- Understand what your task is
- Make a measurement plan (define quantities to be measured, discuss procedure for the measurement, write down expectations, prepare the output plot on paper)
- Show the measurements steps early on to your advisor (IN DETAILS)
- Distinguish **FACTS** from **INTERPRETATION**
- Discuss always facts first → demonstrate the accuracy of measurements
- Then explain the interpretation procedure
- Propose an explanation of the results (sometimes “I have no idea” is acceptable, but not always ... )

# Look around

Rule: No more than 1 day alone on a problem

- Typically your task has been solved by others already before (in your group, in other groups along the corridor, around the world)
- No reason to re-invent the wheel
- Easiest is to ask people around you (generally with more experience)
- If you are stuck always ask fast!

*Savage Chickens*

by Doug Savage



# Writing



- Your thesis **MUST** be handed in **ON TIME**
- The date is known to you (“not to your supervisor”) from day one
- You need time for corrections
- Make an outline at time TW and discuss it with your supervisor
- Make yourself a **reverse-time** schedule:

## action

hand in thesis

implement last corrections

give to Supervisor

write conclusions

write result chapter

...

start to write

## time

end time (ET)

ET – 1 week

ST = ET - 3 weeks

ST – 3 days

T-CH6 = ...

TW = ET – 2.5 months

... and use it to assess your delays ...

# Useful tips



## In the work / analysis phase:

- You should produce **1 plot / month** for your thesis
  - 1 plot = 1 established result / conclusion, thought to the end
  - not perfectly linear rule (more exponential),  
but think 12 months = 12 plots = 12 pages of relevant results
  - Make sure every “final plot” looks “thesis like” (define good style of plots from beginning, use for all plots, document your code / data to find them later)

## In the writing phase:

- You can write **1 chapter / week**
- Leave the chapter for >3 days, then read again out loud
- First put all plots in a chapter and write captions
- Then ask yourself what do you need to explain the plots (order of info, definition of axis variables, explanation of legends, ... )



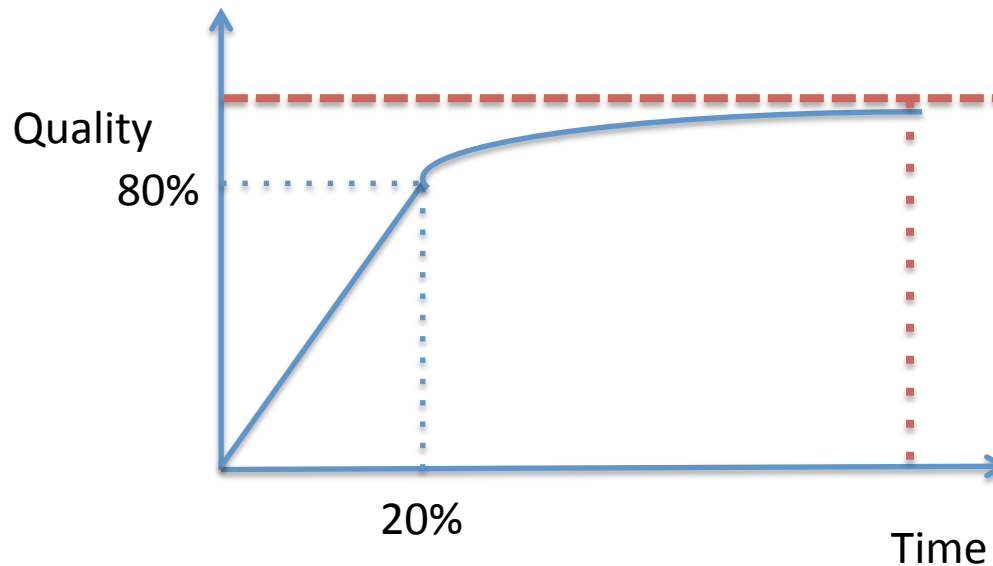
# Punctuality vs quality



- Punctuality is sometimes “forgotten” in scientific world
- In companies your head hangs on it!

Rule: 80 % of the work quality is achieved in the first 20% of the time

- Perfection is asymptotic, can be approached with infinite time



- Get as precise as you can in the given time... then quote your errors right!

# The thesis topics

- Quantification of the radiation damage on SiPM
- Optimization of a novel positron emission tomography detector
- Silicon Photomultiplier response curve
- Homogeneity of the response of a plastic scintillator tile
- Calibration of the CMS pixel detector with X-ray source

Contact person: Marco Ramilli      (marco.ramilli@desy.de)

- Silicon Strip Sensors characterization for the Phase 2 Upgrade of CMS
- Design of module and support structures for the future CMS tracker

Contact person: Doris Eckstein      (doris.eckstein@desy.de)

# Your task

- Understand what the physics question is
  - Read about the topic (some papers are suggested but you will need much more!)
  - Discuss with your advisor (Marco, Doris, ... if you like get the names of the PhD students working on these projects and talk to them...)
  - Formulate a plan for your “master work”
  
  - Present in 15 min an introduction to your topic trying to answer the discussion points proposed in each of the thesis description.
- ➔ To be presented on the 11.07.12 (4 hours / N students)

Tip: don't start 2 days before... this is really a lot of work (~ 2 weeks full time!)