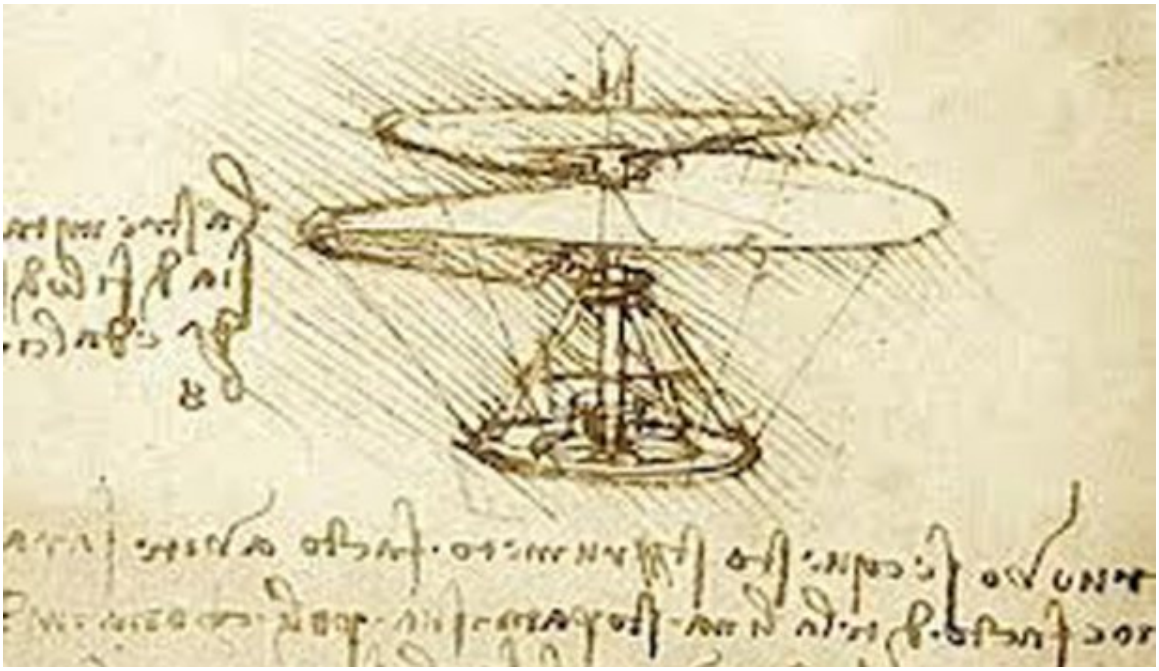
Lab Notebooks

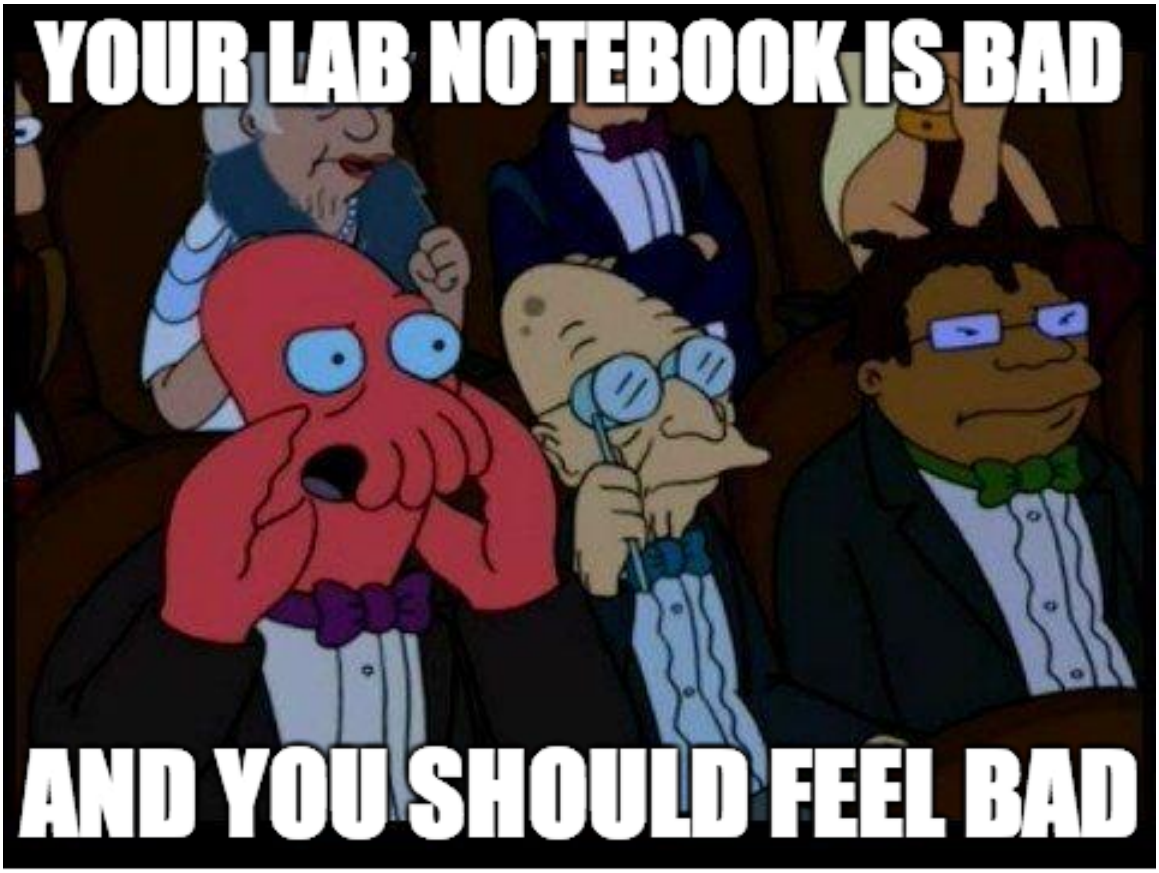
Leonardo da Vinci



Modern World

- Legal (Patents, other disputes (e.g., Facebook))
- Reproducibility (*Cold Fusion*?)
- Personal record of work (mental health)

Bad Notebook (Futurama)



https://twitter.com/figshare/status/483310011020750849/photo/1

The Need for Notebooks

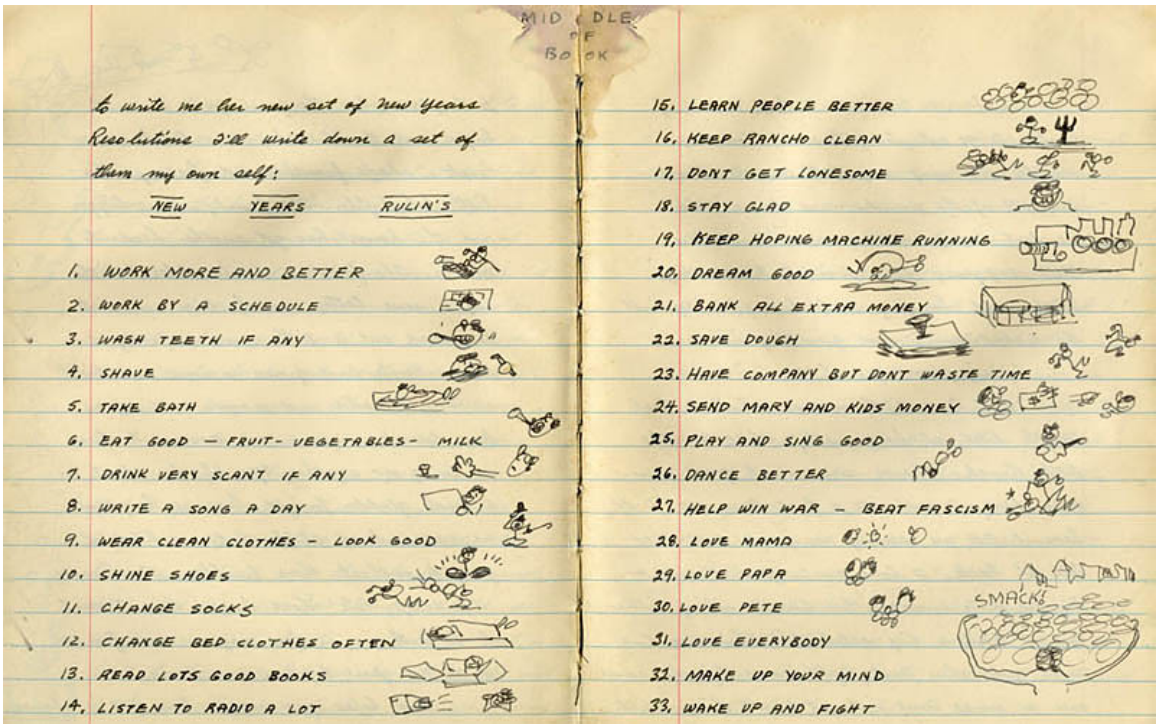
I think the most important thing we need is an electronic lab notebook that really allows us to go back and understand exactly what we did, repeat it, modify it, record it, etc. If you accept this, it leads to a number of points:

1. Why don't more people (including me) do this now?
2. What tool(s) should we use?
3. How should this integrate into the publication process (for papers, software, data, etc.)

https://danielskatzblog.wordpress.com/2015/07/15/the-need-for-notebooks/

Woody Guthrie's Notebook

Woody Guthrie's New Year's Resolutions – 1941



MIDDLE OF BOOK

to write me her new set of new years Resolutions I'll write down a set of them my own self:

NEW YEARS RULIN'S

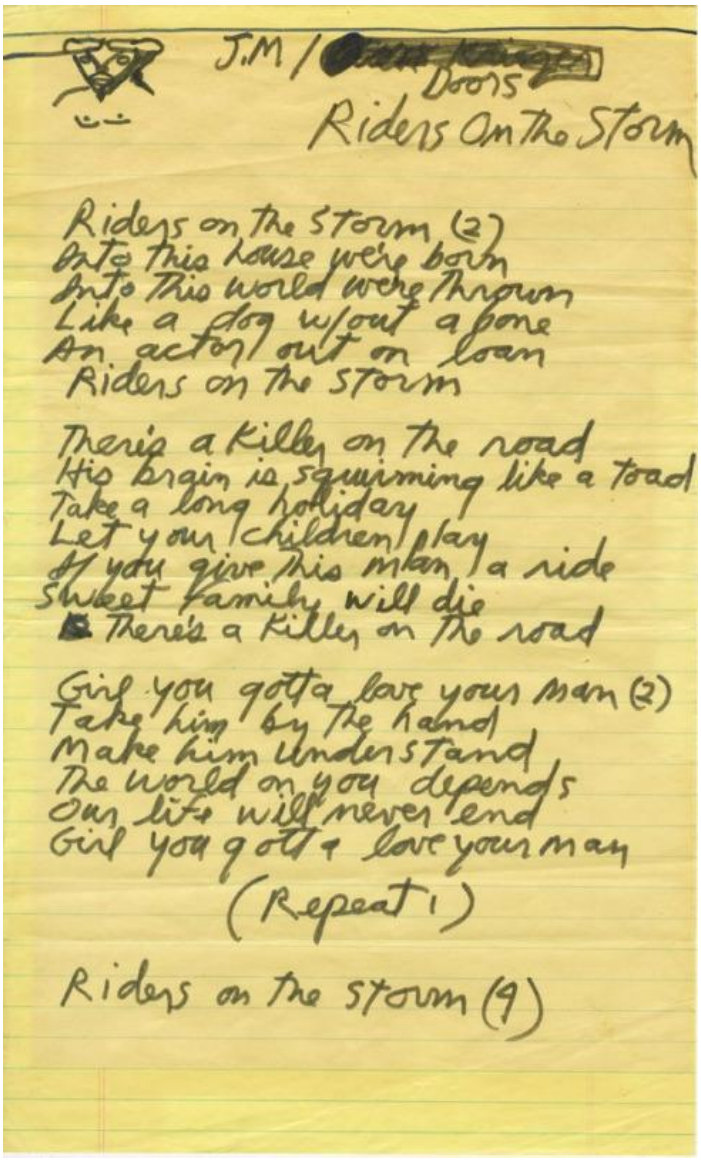
1. WORK MORE AND BETTER
2. WORK BY A SCHEDULE
3. WASH TEETH IF ANY
4. SHAVE
5. TAKE BATH
6. EAT GOOD – FRUIT – VEGETABLES – MILK
7. DRINK VERY SCANT IF ANY
8. WRITE A SONG A DAY
9. WEAR CLEAN CLOTHES – LOOK GOOD
10. SHINE SHOES
11. CHANGE SOCKS
12. CHANGE BED CLOTHES OFTEN
13. READ LOTS GOOD BOOKS
14. LISTEN TO RADIO A LOT
15. LEARN PEOPLE BETTER
16. KEEP RANCHO CLEAN
17. DONT GET LONESOME
18. STAY GLAD
19. KEEP HOPING MACHINE RUNNING
20. DREAM GOOD
21. BANK ALL EXTRA MONEY
22. SAVE DOUGH
23. HAVE COMPANY BUT DONT WASTE TIME
24. SEND MARY AND KIDS MONEY
25. PLAY AND SING GOOD
26. DANCE BETTER
27. HELP WIN WAR – BEAT FASCISM
28. LOVE MAMA
29. LOVE PAPA
30. LOVE PETE
31. LOVE EVERYBODY
32. MAKE UP YOUR MIND
33. WAKE UP AND FIGHT

SMACKS

http://www.listsofnote.com/2011/12/new-years-rulins.html

Jim Morrison (The Doors) Notebook

Jim Morrison's handwritten lyrics for *Riders On the Storm*.



J.M. / [redacted] Doors

Riders On The Storm

Riders on the Storm (2)
Into this house we're born
Into this world we're thrown
Like a dog w/out a bone
An actor out on loan
Riders on the Storm

There's a Killer on the road
His brain is squirming like a toad
Take a long holiday
Let your children play
If you give this man a ride
Sweet family will die
There's a Killer on the road

Girl you gotta love your man (2)
Take him by the hand
Make him understand
The world on you depends
Our life will never end
Girl you gotta love your man
(Repeat 1)

Riders on the Storm (4)

https://twitter.com/oldpicsarchive/status/639078637501829120/photo/1

Shockley Invents the Junction Transistor – 1947

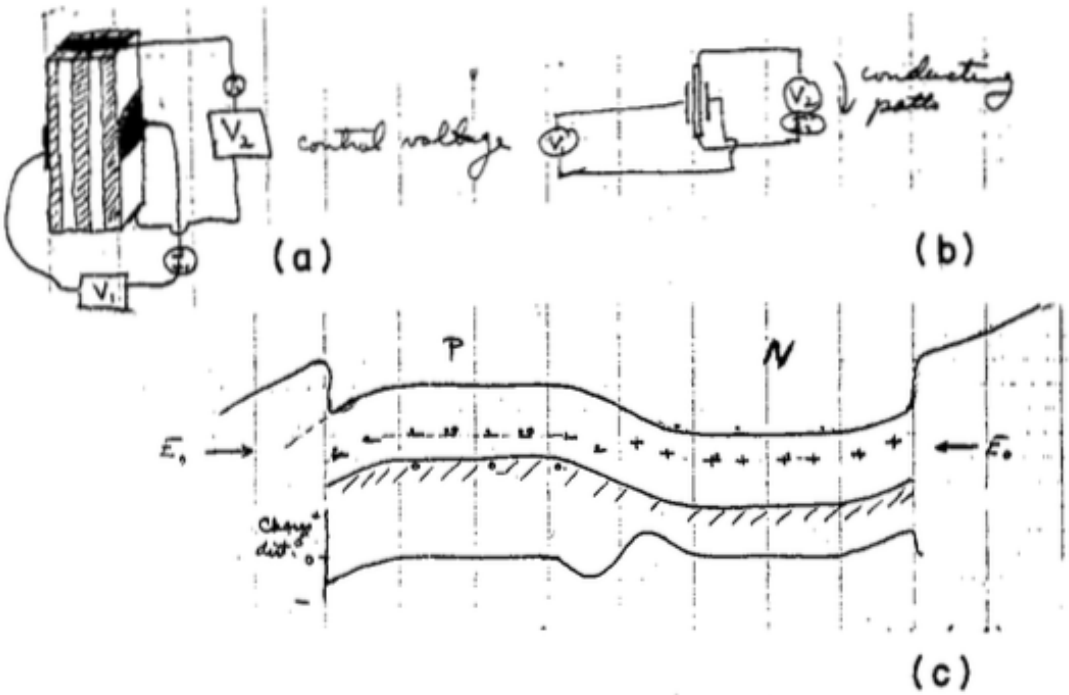


Fig. 5. Field-effect disclosures in Shockley's notebook of ideas developed after a five-year gap caused by World War II. (a) An amplifying structure and circuit, dated 13 April 1945, composed of a sequence of parallel layers. (b) A similar amplifying circuit, dated 16 April 1945, using a single layer, and (c) a proposed layer structure utilizing space-charge penetration at two surfaces without any net charge being added to the layer by virtue of the presence of a p-n junction.

http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1478477

http://www.pbs.org/transistor/background1/events/junctinv.html

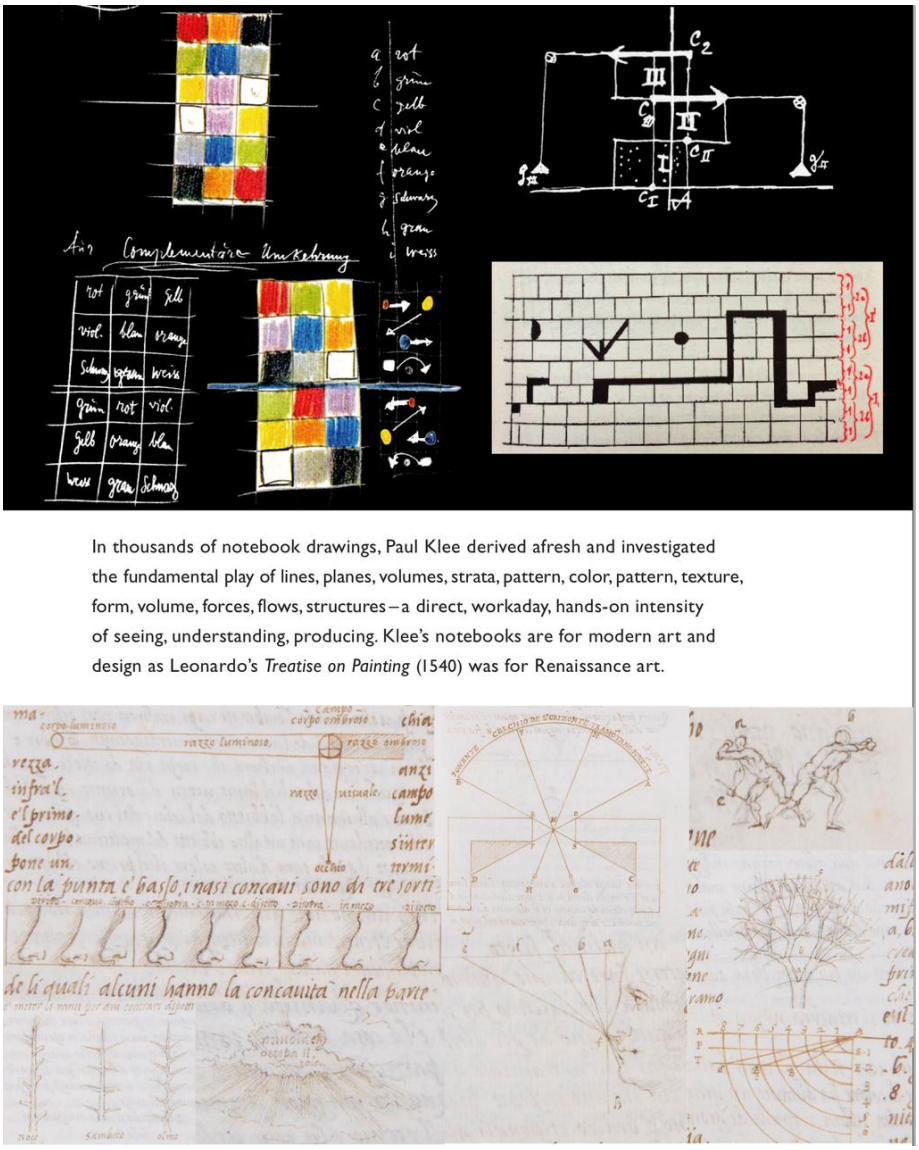
Open Notebook Science

@kaythaney
Interesting. New online class teaches you the importance of and how to manage an open lab notebook in 2 weeks. http://t.co/QyNd3OPr8Y #ONS
6/16/13 4:00 PM

http://scifundchallenge.org/blog/2013/06/15/welcome-to-scifund-201-open-notebook-

Paul Klee & Leonardo da Vinci Compared

Paul Klee & Leonardo Treatise on Painting (1540) compared, draft page ET, *The Thinking Eye*.



https://twitter.com/EdwardTufte/status/612469459517861888/photo/1

Thomas Jefferson's unique pocket notebook

Renaissance man Thomas Jefferson had a mind that never stopped, so he needed a way of jotting down notes on the go to be recorded in notebooks by night at Monticello.

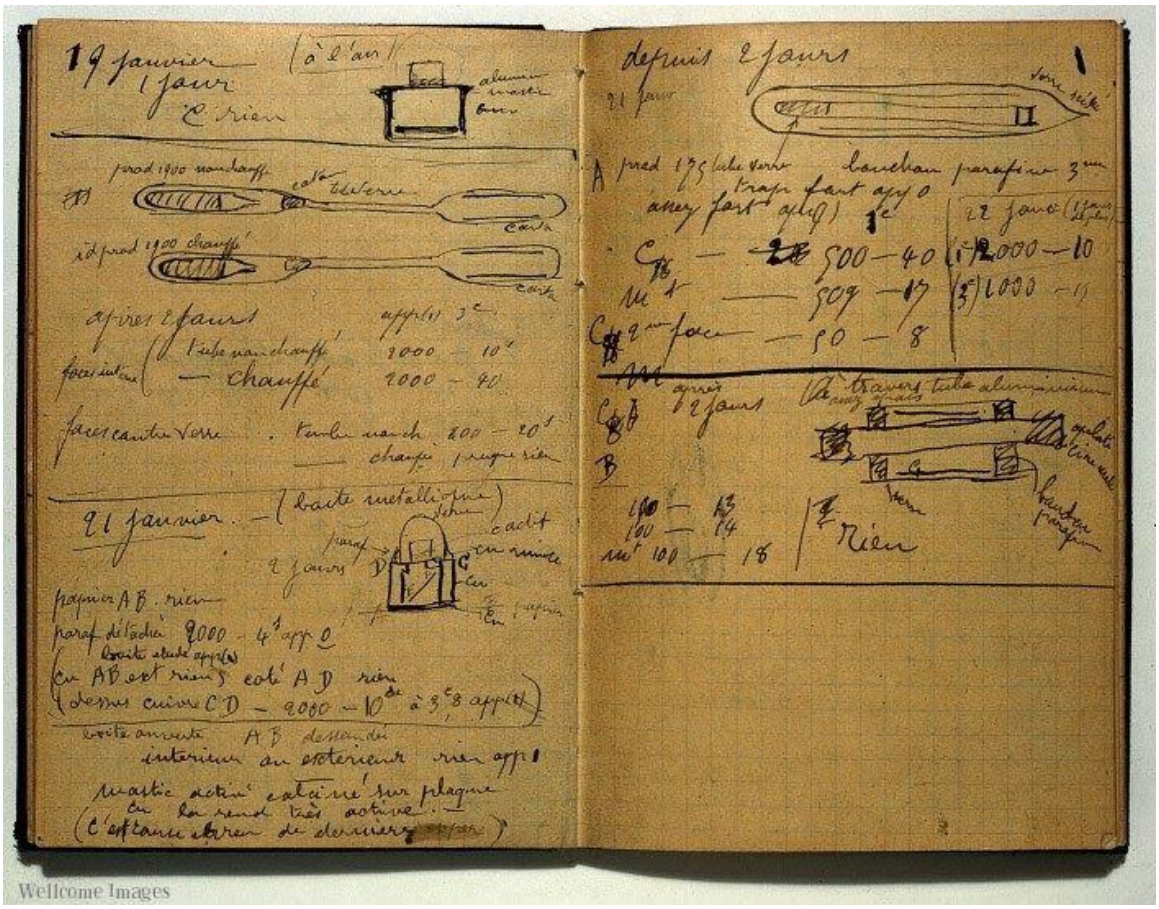
The solution?

Pages of ivory that could be erased once his ideas were transcribed.

http://holykaw.alltop.com/thomas-jeffersons-unique-pocket-notebook

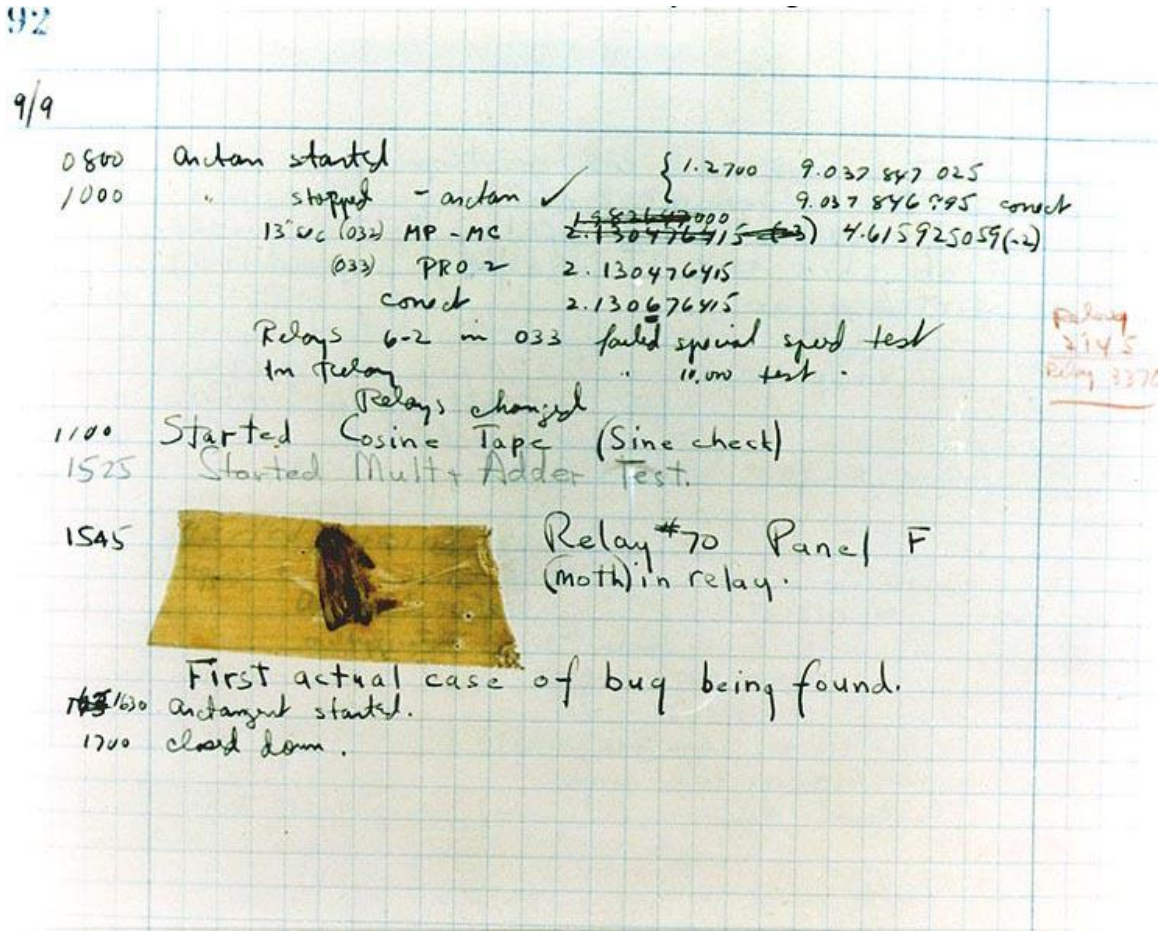
Marie Curie's papers

Marie Curie's papers, clothing, furniture, etc Radioactive and will be for >1,500 years.



http://www.openculture.com/2015/07/marie-curies-research-papers-are-still-radioac
html

First Computer Bug



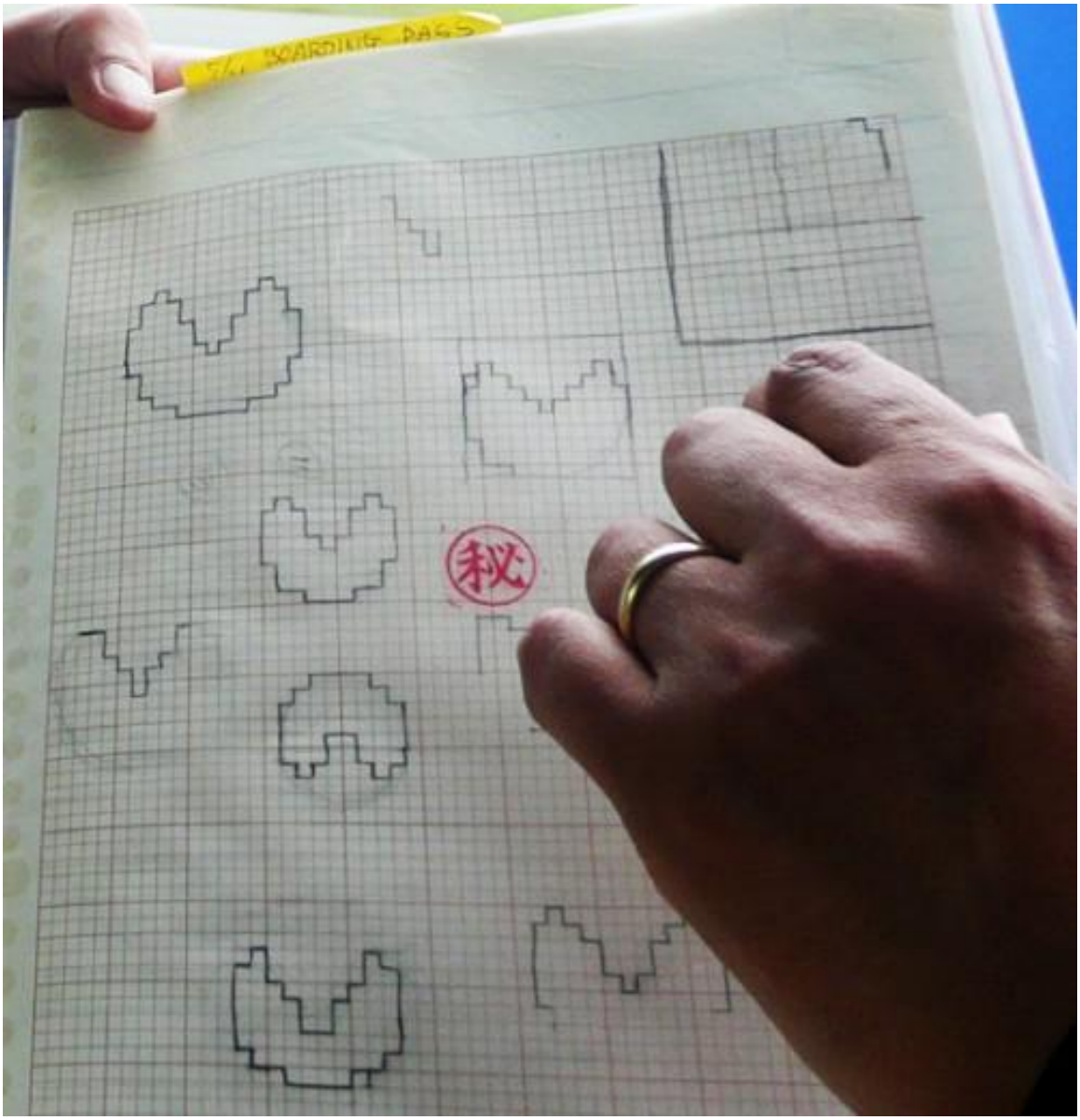
A moth found trapped between points at Relay # 70, Panel F, of the Mark II Aiken Relay Calculator while it was being tested at Harvard University, 9 September 1947. The operators affixed the moth to the computer log, with the entry: "First actual case of bug being found." They put out the word that they had "debugged" the machine, thus introducing the term "debugging a computer program."

https://www.facebook.com/media/set/?set=a.10150265545333344.318488.76845133343&type=3

Creation of Pac-Man

Toru Iwatani, creator of Pac-Man, showed the *Control* magazine some original drafts of Pac-Man!


1UP
99990
99990
①
②
秘
HI SCORE 99990
パターン例 A



https://twitter.com/NandoMSWriter/status/562046638005706753

Losing a Notebook

@osxreverser
F***!!!!! I guess I lost most of my previous EFI research. Can't find my firmware bruteforcer and notes. Grrrrrrrrrrrrrrrrrrrr!!"!(/!#"&/%!#
1/2/15, 3:45 AM

https://twitter.com/osxreverser/status/550981256222367744

A gallery of interesting IPython Notebooks

https://github.com/ipython/ipython/wiki/A-gallery-of-interesting-IPython-Notebook

Double Pendulum

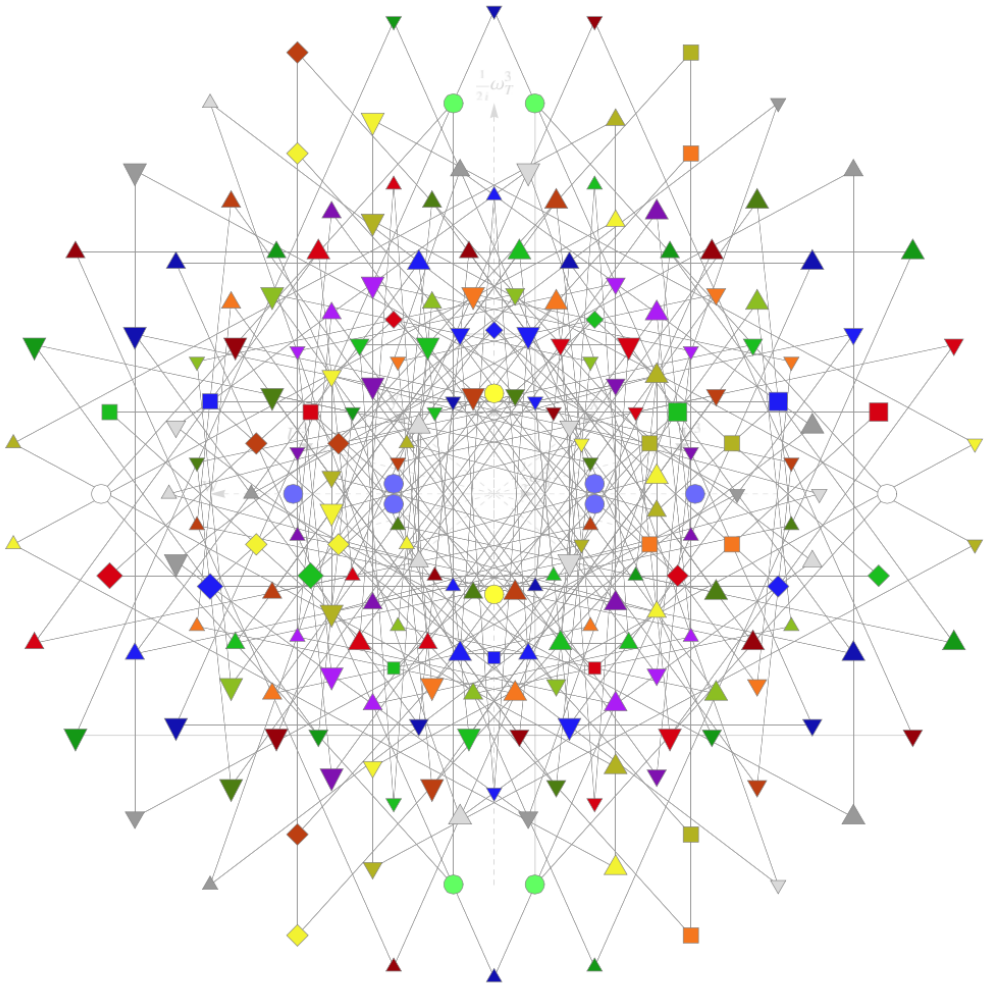
https://plot.ly/python/streaming-double-pendulum-tutorial/

Kalman and Bayesian Filters in Python

http://nbviewer.ipython.org/github/rlabbe/Kalman-and-Bayesian-Filters-in-Python/blob/master/table_of_contents.ipynb

Garrett Lisi (Physicist, The Theory of Everything)

Home page: http://li.si



The E8 root system, with each root assigned to an elementary particle field.

Personal wiki notebook in theoretical physics.
http://deferentialgeometry.org

Engineering Logbooks

http://www.webpages.uidaho.edu/mindworks/Capstone%20Design/Project%20Guides/Logbook_Handout.pdf

ENGINEERING LOGBOOKS

Definition:

An engineering logbook is a personal/professional reference about project learning and results. To protect intellectual property in the workplace, it should be bound so that pages cannot be inserted/removed, written in ink, dated, and fill consecutive pages.

Rationale:

High performing individuals in all professions are similar to the extent that they monitor and control where they invest their time, they learn and apply the best practices their profession, and they regularly take time to learn from their successes and failures.

General Expectations:

- 5-6 pages of thoughtful entries per week in support of a quality design process
- log of planning, communications, team meetings, and lecture notes (~20% of entries)
- project learning and product development (~70% of entries)
- review of individual/team/product performance (~10% of entries)
- organization/format for easy re-reading/re-use (self, team, mentor, instructor)

Industry Expectations:

1. Record the date on each page. Start each day on a new page.
2. Label each entry and record this in a table of contents (reserve 3-4 pages at start).
3. Use ink. Do not erase. Delete an entry by neatly drawing a single line through it.
4. Do not remove pages, and do not skip pages.
5. Avoid backfilling. If you realize later that you left something out, or just want to summarize something, go ahead and write it in, noting that it's after-the-fact.
6. Include *everything* you contribute to … good, bad, and ugly.

Sketches/doodling	Customer needs/requirements
Class notes	Project objectives
Meeting notes	Action Items
Half-baked Ideas	Math calculations
Work-in-progress	Design alternatives
Vendor notes	Research findings
Sources of ideas	Evaluation of data/results
Design reviews	Decision criteria
Design process	Rationale for decisions
Project reflections	Professional development

Logbook Prompts:

If you just finished…	**Ask yourself…**
A meeting,	• What were the main outcomes of the meeting? • Was the meeting productive, and why? • What are your personal action items before the next meeting? • Is the team heading in the right direction?
Brainstorming,	• Which ideas seem most feasible, and why? • Are there enough good ideas? • How could better ideas be developed based on this session?
Engineering Analysis,	• What were the governing equations? • What were the most important findings? • What do the results mean and how should they be applied?
Visualization, (by hand or in CAD)	• What are the major features/discoveries and why are these significant? • What was learned about the problem or solution possibilities? • What problems were resolved and what still needs to be addressed? • How does this piece integrate with the whole?
An internet search	• What key information did I find? How does it help achieve the project objectives? • Are there other sources that should be pursued? • What new questions were generated?

LOGBOOK REVIEW FORM

Engineer: **Reviewer:** **Date:**

STEP 1: Inventory your six best logbook entries and rate each one using the rubric below.

1- Missing	2- Incomplete, minimal long-term value to author	3 – Complete, clear long-term value to author	4 – Exemplary, considerable long-term value to others

Entry	Date	Rating

STEP 2: Self-assess your logbook in the areas below using the scales provided.
---------- 2----------3----------4----------

Project Management → overall rating for logbook since last review

___ vague goals ___ multiple/divergent goals ___ focused & strategic goals

___ few action items ___ sequenced tasks ___ tasks remove bottlenecks

___ few team/client notes ___ some team/client notes ___ extensive team/client notes
(in the context of ME 410, consider your client to be mentors, staff, and instructors)

Design Development → overall rating for logbook since last review

___ sparse notes & analysis ___ relevant notes & analysis ___ detailed notes & analysis

___ random decisions ___ major decisions highlighted ___ key decisions justified

___ no illustrations ___ basic illustrations w/o discussion ___ detailed illustrations & discussion

Assessment (of self & team) → overall rating for logbook since last review

___ little reflection ___ occasional reflection ___ regular & effective reflection

___ little awareness of strengths ___ basic awareness of strengths ___ detailed knowledge of strengths

___ little awareness improvements ___ some areas cited for improvement ___ detailed action plans for improvement

Organization → overall rating for logbook since last review

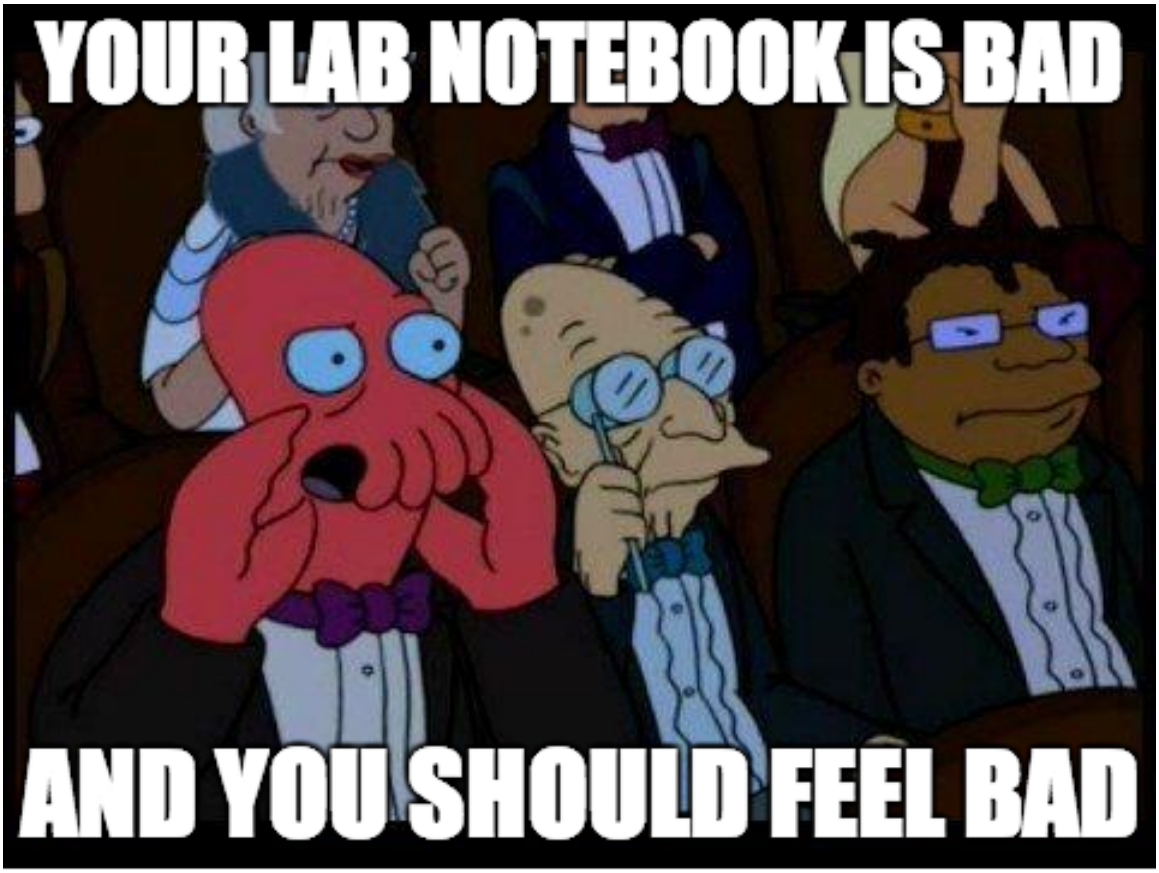
___ entries on demand ___ regular entries ___ spontaneous entries

___ entries without labels ___ entries with generic labels ___ entries with informative labels

___ haphazard layout ___ readable ___ thoughtful layout for rereading

STEP 3: Paste this form in your logbook and make an entry examining the two greatest strengths and two greatest areas for improvement in your personal documentation. State why each strength as well as each improvement adds value. Explain how you might implement each improvement.

Bad Notebook (Futurama)



https://twitter.com/figshare/status/483310011020750849/photo/1