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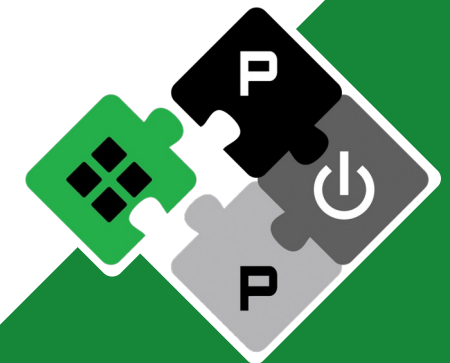


The quest for Open PDKs

Frank K. Gürkaynak kgf@iis.ee.ethz.ch

PULP Platform

Open Source Hardware, the way it should be!



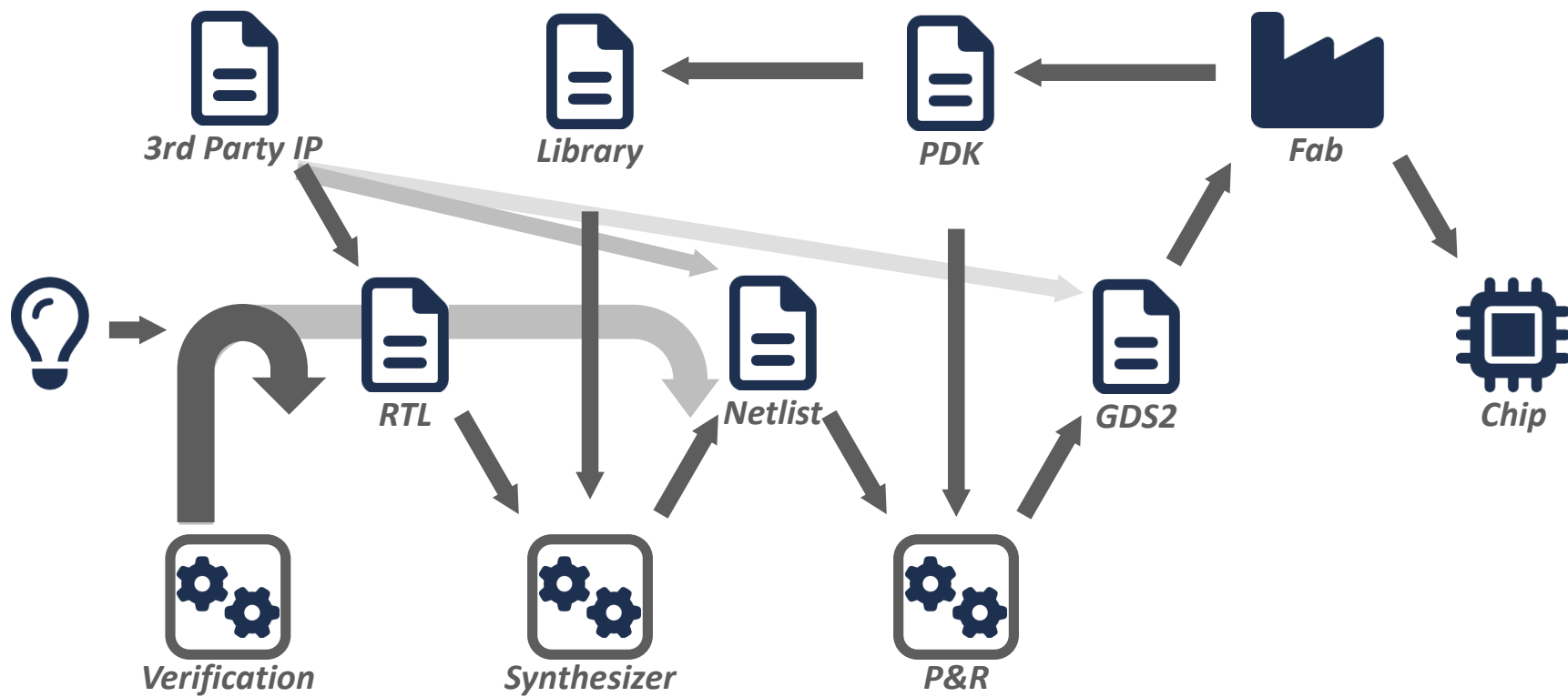
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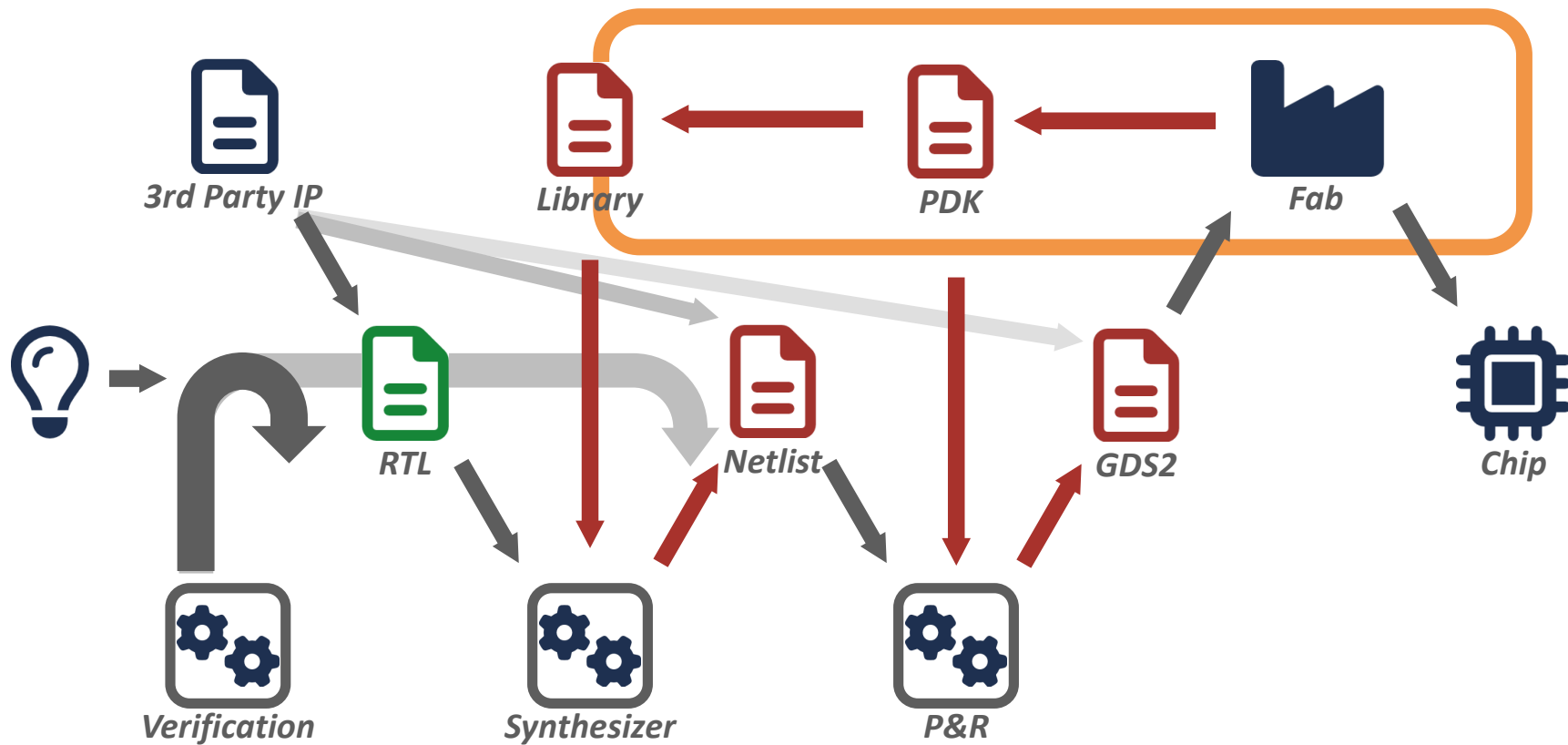
Simplified IC design flow



Icons taken from free icons from fontawesome.com



Simplified IC design flow: technology provider



Fabs do not make PDK information accessible

for Open PDKs - ORConf 2026 - Frank K. Gürkaynak



OpenPDKs are essential for end-to-end open hardware



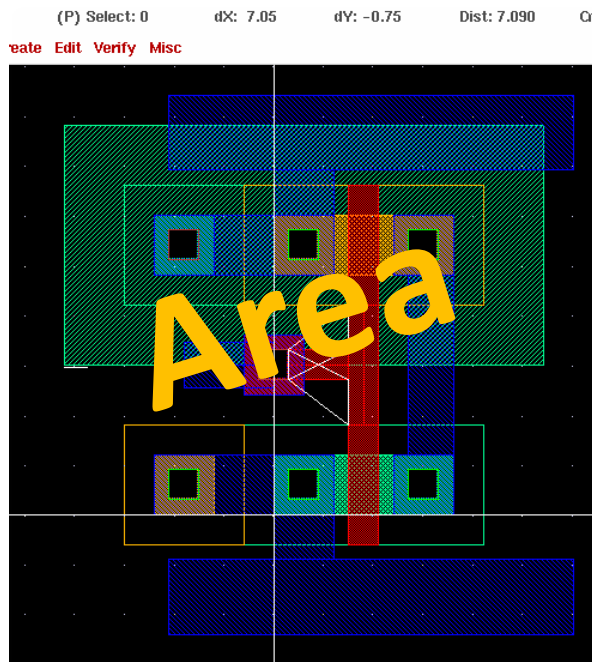
- **End-to-end open hardware provides access to all views of the design**
 - Spec, RTL, testbenches, netlists, scripts, physical design data (GDS)
- **Needed to have open physical IP with silicon validation that can be shared**
 - Processors, clocking solutions, memory interfaces, high-speed serial links, data converters power converters, analog front-ends, standard cells, memories, I/O drivers..
- **Would allow more complex designs to be realized through sub-design sharing**
 - Stand on the shoulder of giants: re-use/share common parts of the design
- **Even if you used open EDA, without open PDK, the output would not be open**
 - Major blocking point in end-to-end open design
 - Open EDA will also benefit from more open technologies.
- **Newer technology nodes add new challenges**
 - And these can not be solved by the community if we do not have access to openPDKs



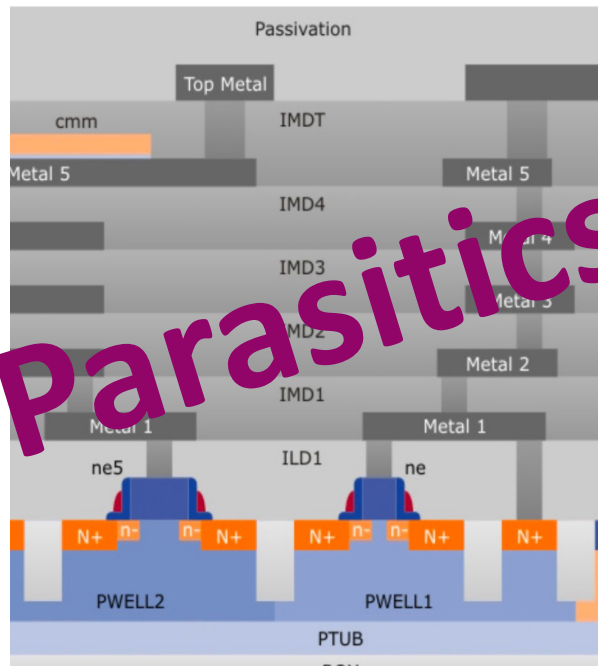
What is the "secret" information that is in the PDK?



Design Rules



Layer Stack



Transistor Models

```
** PTM-MG 20nm HSPICE Model Card for HP
** Nominal VDD=0.9V

.model nfet nmos level = 72
+ bulkmod = 1
+ lmin      = 1e-008          lmax      = 2.4
+*****
+***** general *****
+*****
+version = 105.03             +bulkmod = 1
+gidlmod = 0                  +lmin    = 0
+rgatemod = 0                 +geomod = 1
+coremod  = 0                 +cgeomod = 2
+***** process *****
+eot      = 8.1e-010          +eotbox  = 1.4
+nbodysub = 5e+023            +phig    = 4.3
+easub    = 4.05              +ni0sub  = 1.1
+nsd      = 3e+026            +ngate   = 0
+nseg     = 5                  +l       = 2.4
+***** w/l *****
+xl        = 0                +lint    = 1e-
+llc       = 0                +dlc     = 0
+fech      = 1                +deltaw  = 0
+hapi      = 1e-008
+***** geometry *****
+*****
```

Nothing in a PDK will allow others to manufacture chips in this technology



Back in the day we said (ORConf2018 - Gdansk)



What's next

- **Convincing any foundry to give access to PDK is not easy**
 - Do not expect this to happen short term (> 5 years)
- **But it will happen**
 - It makes sense
 - It has the potential to increase revenue for the foundry (maybe not for others)
 - It will not cost the foundries extra (no active support needed)
- **We need to raise awareness for the need for open hardware**
 - We need to have the discussion, why the PDK access is not open
 - Discussions will eventually lead to change



We have some Open PDKs for actual chips, we need more



- **Plenty of OpenPDKs for virtual technologies**
 - Meant for EDA tool exploration
 - While they mimic modern nodes (i.e. 3nm) the available PDKs are quite basic.
- **Some OpenPDKs are sponsored by the foundry**
 - Globalfoundries 180MCU (not really 180nm)
 - IHP130 (not really that many runs/volume available)
- **The rest is made open through effort of third parties**
 - Skywater 130 (supported by Efabless, Google)
 - ICSprout 55 (supported by BOSC)
- **Distinction is important: it changes the way you can access them**
 - ETHZ through repeated attempts was not able to use Skywater130 or ICSprout55 until now

We need more PDKs for newer technology nodes



Why are companies hesitant to make PDKs open



- **Exposes more information to public, liability, reputation concerns**
 - The more you make things public, the more public scrutiny you will get
 - Companies want to be prepared with their offerings, do not want to tarnish their reputation
 - Additional risk, and concerns that you did not ask for.
- **Some parts of the PDK may have been licensed by third parties**
 - The company may not have the right to open these parts
 - Or the company will have to figure out whether or not they have the right to open them
- **It requires change from the current way of doing things == effort is needed**
 - Any change will require effort, which has a real cost to the company
- **The most IMPORTANT ISSUE: It is not clear if these costs will pay off**
 - Will the company sell more wafers if it opens a PDK?
 - Will the extra revenue justify the effort/cost that they are putting in



Actual discussion we had with a technology provider



- *It is the technical group in charge of technology information that marks certain information as “classified”*
- *If information is “classified” we require an NDA to make it available to others*
- *If we want to make a change, we will ask the group is it OK to make this public*
- *They ask “what does this mean”*
- *Would you be comfortable reading about what you have here tomorrow on the Financial Times.*
- *They say “maybe not”*
- *And then things remain under NDA*



It is not only releasing some information



- **There are necessary parts that are not provided by the technology company**
 - Standard cells, I/O cells, memories are usually contributed by IP vendors (Artisan, Synopsys)
 - Supporting files for tools (P&R tools, parasitic extraction engines, DRC/LVS rules..)
 - Someone needs to provide these
- **The PDK will need regular updates**
 - The company will have to manage multiple PDKs and keep them in sync
- **How to evaluate user feedback, bugs, feature requests, contributions**
 - Forks and multiple versions of the same PDK are not really helpful for IC manufacturing
 - Maintaining the official version of the PDK requires proper governance
 - Requires experience and patience (there will be mistakes), it is not automatic.



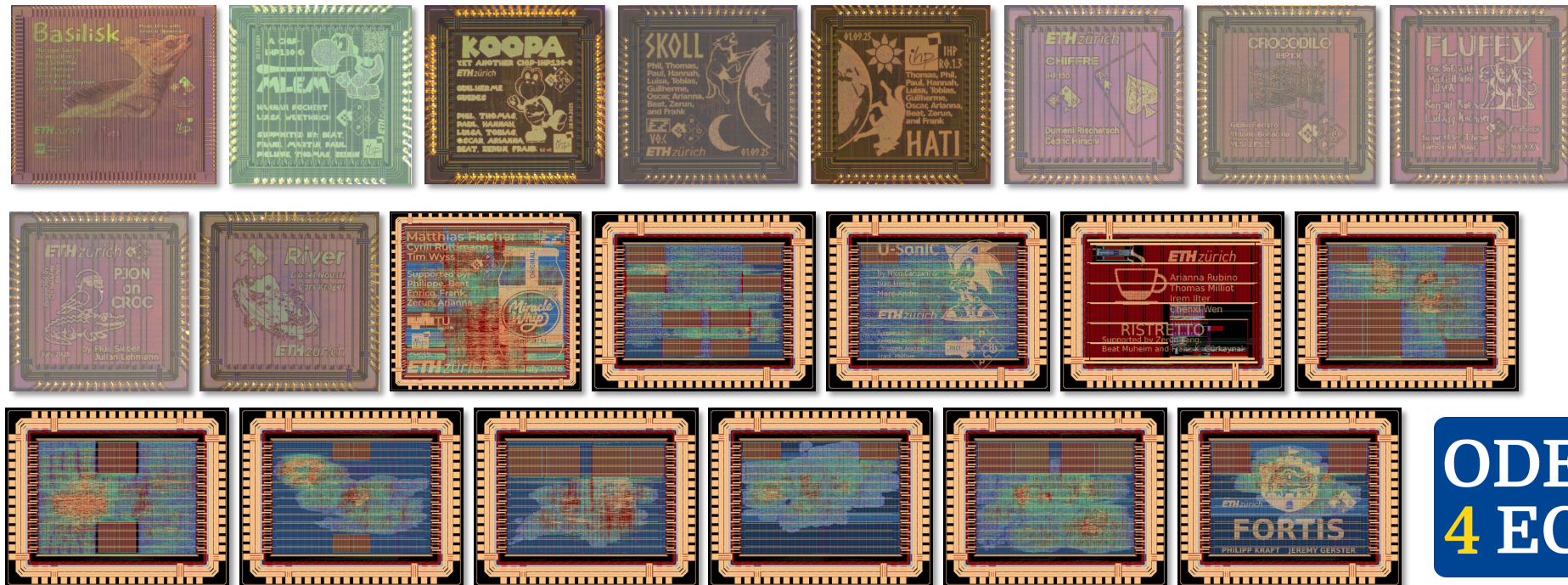
So are we close for other open PDKs?



- **No official announcement yet**
- **But one technology provider is in touch to explore this possibility**
 - There is definitely interest
 - There are also concerns and uncertainties that add to the risk
 - They are reaching out to understand how these could be handled
- **If this happens, it would be the most advanced OpenPDK available**
 - Before you get too excited it is not 7nm or smaller
- **Signs are good for an open release, but we still need to wait and see**
 - Maybe even an announcement this year?
 - If it happens, there will be a lot of work to do 😊



We have come this far, and there will be more Open PDKs



End-to-end open chips from our gallery <http://asic.ethz.ch>

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The quest for Open PDKs - ORConf 2026 - Frank K. Gürkaynak



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on Open Source IC and system design
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