IEEE 2401-2019 Publication with Supporting IBIS Version 7.0

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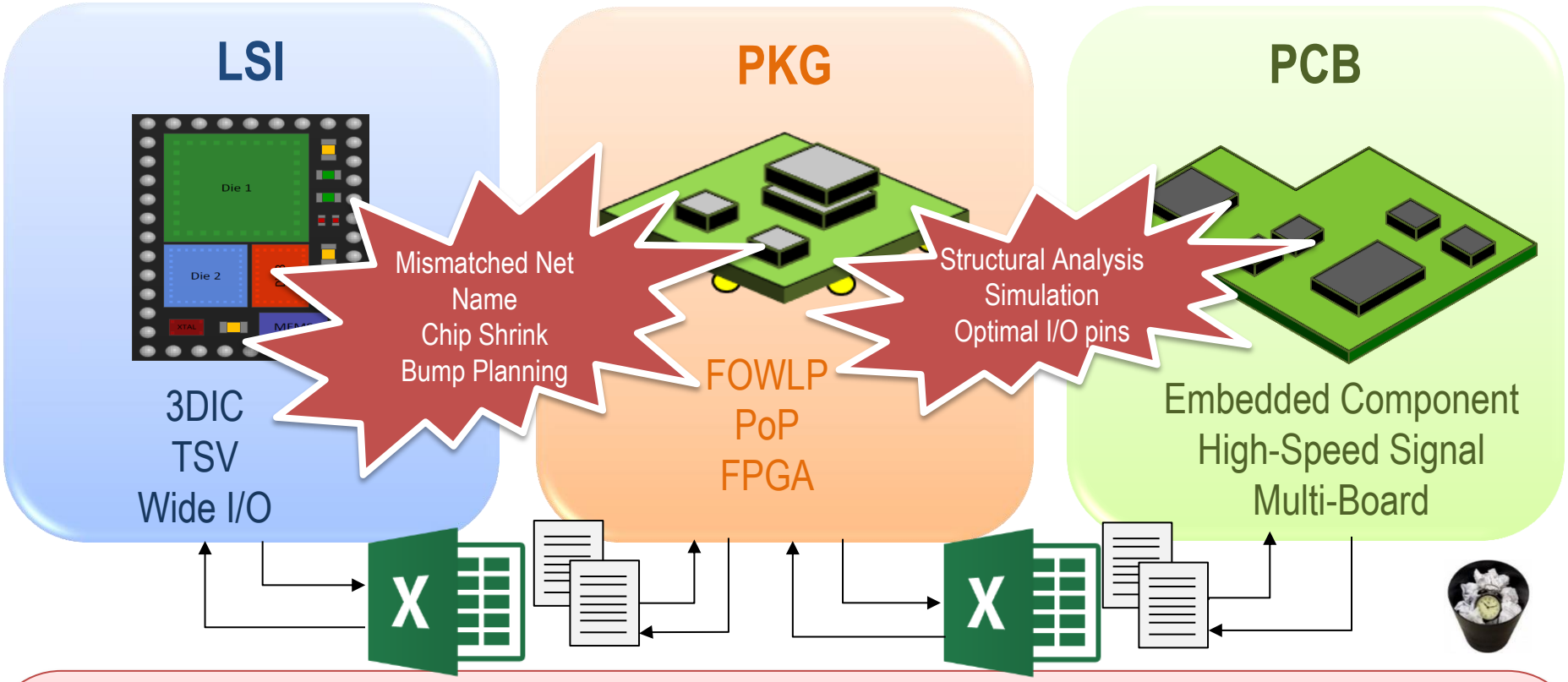
DesignCon IBIS Summit

Santa Clara, California

LSI/PKG/PCB Co-design Challenges



Spreadsheet management → Human errors occurring frequently

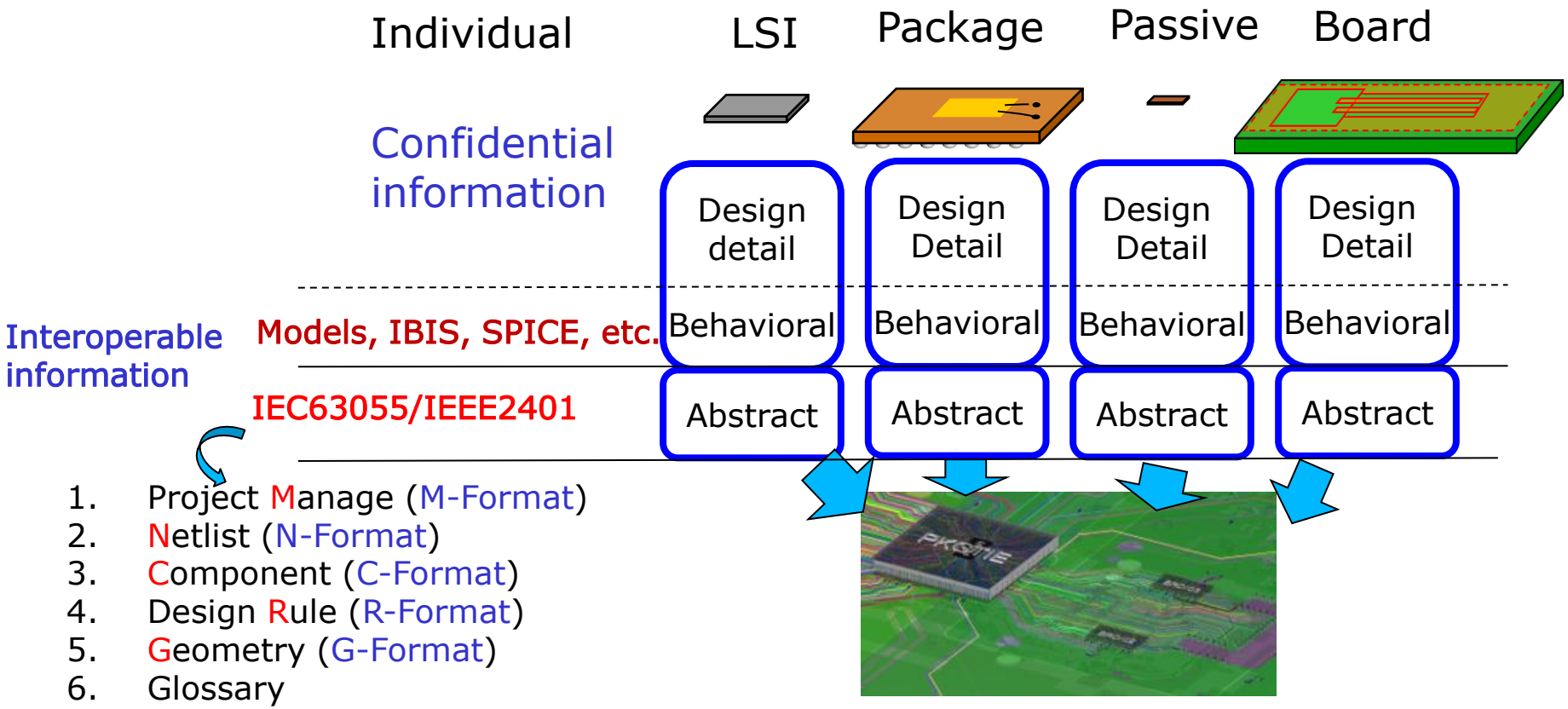
Various interfaces → Difficulty in unifying design flows

Diverse design cultures → An impediment to sharing constraints, leading to increasing iteration

What is LPB Format?

Standard format for LSI Package Board (LPB) interoperable design.

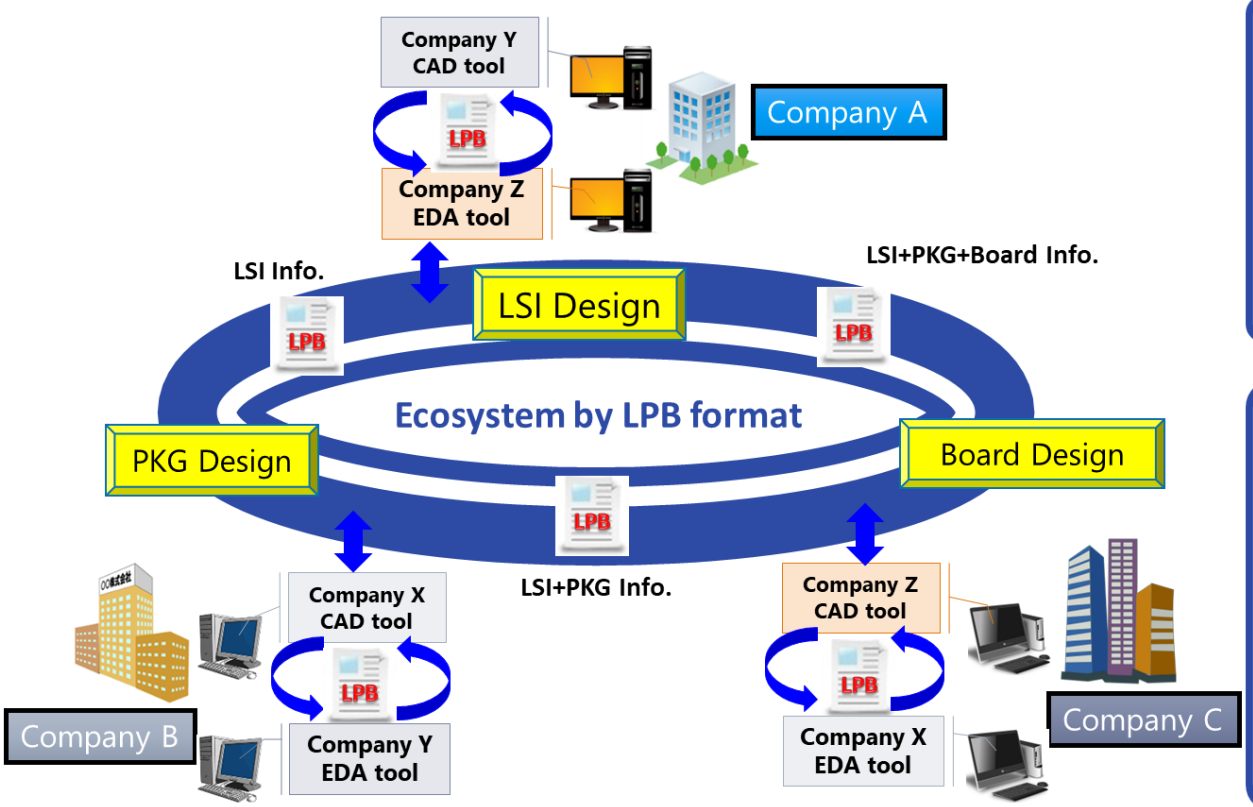
For effective information exchange in supply chain.

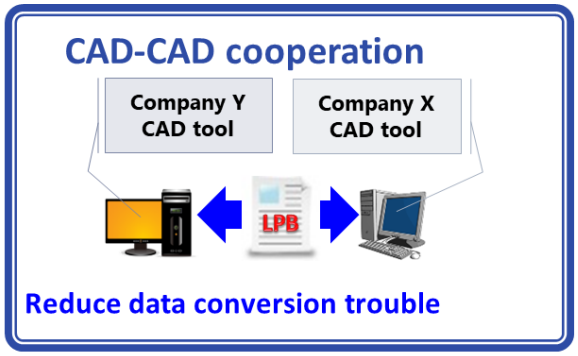


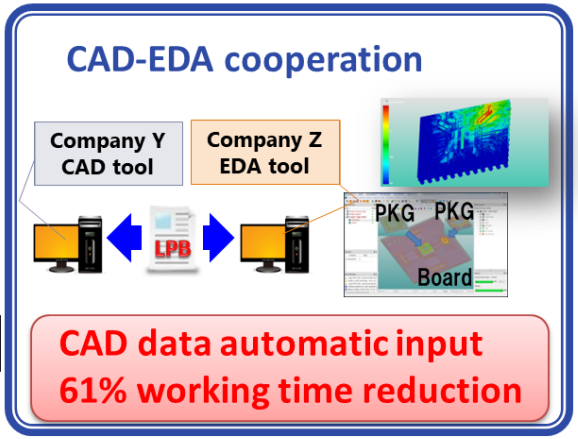
1. Project Manage (M-Format)
2. Netlist (N-Format)
3. Component (C-Format)
4. Design Rule (R-Format)
5. Geometry (G-Format)
6. Glossary

What is the merit for user

IEEE2401 user can reduce overall design time.

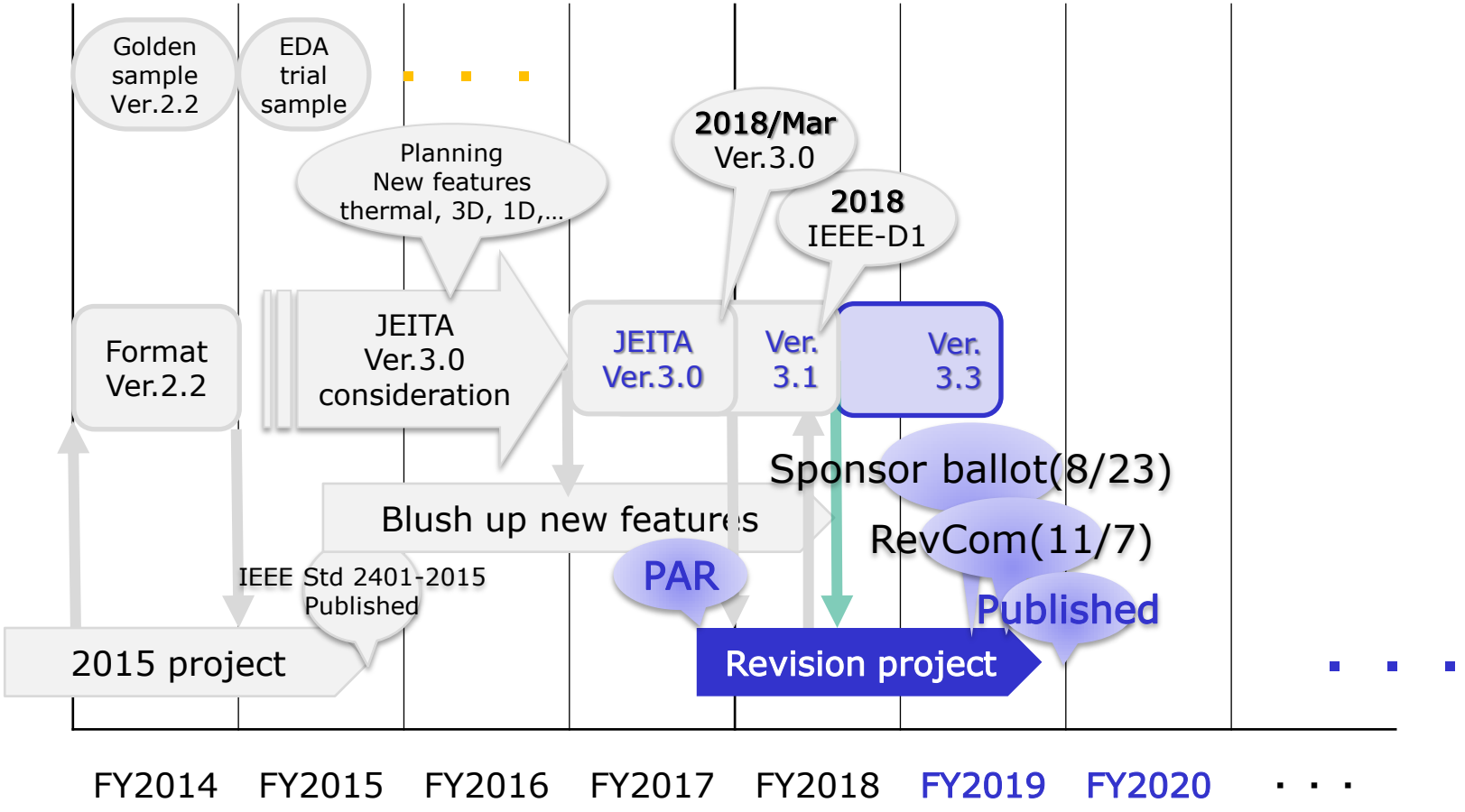






Revision with enhancement of IEEE 2401-2015

- IEEE-2401-2019 is published



Highlights in IEEE2401-2019 enhancement

Additional support of several models

- Electrical model (IBIS Version 7.0, S-para touchstone)
- Thermal model（Delphy, 2Resistor, JTAM)
- 3D structure（STEP, SAT, IGES)
- ・・・

P&R guidelines (Constraints)

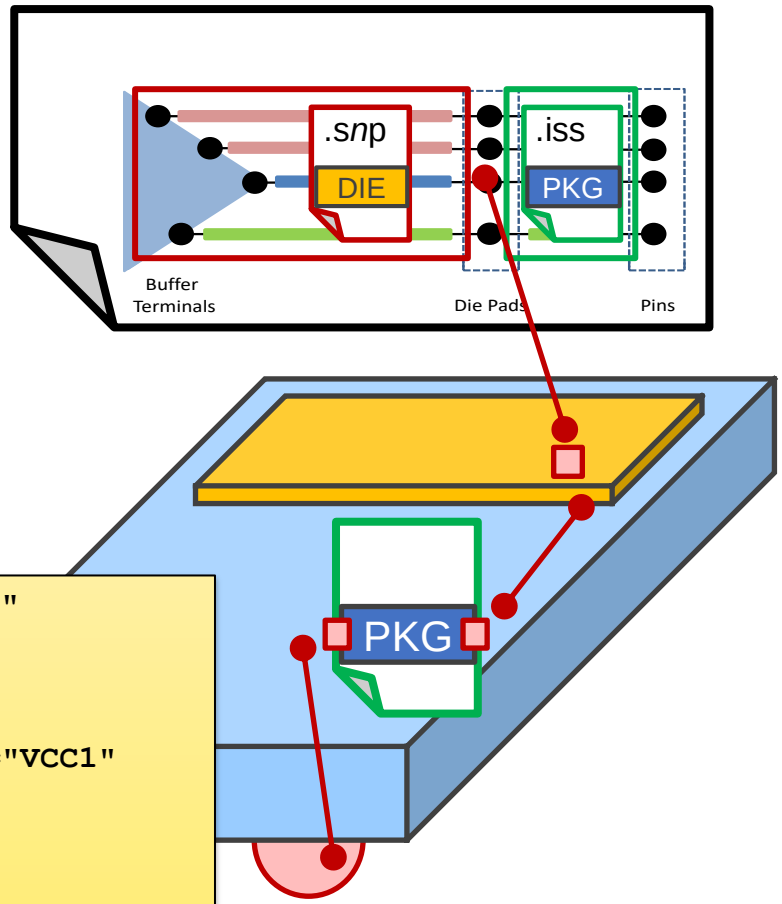
Function to organize data files and history

IEEE2401-2019 linking with IBIS Version 7.0

[Interconnect Model] can define die pad.

IEEE2401-2019 supports directly referencing the die pad on IBIS like [Interconnect Model], and to add Touchstone and IBIS-ISS as referring models.

Therefore, DIE and PKG module can be available separately without double counting problem.




```
<reference xmlns:ibis="http://www.jeita.or.jp/LPB/ibis"
   reffile="XXXX.ibs" format="IBIS"
>
   <connection socket_name="socket1" port_id="A1">
      <ibis:ref_port component="ibis_die" signal_name="VCC1"
      terminal_type="Pad_Rail" />
   </connection>
   <connection socket_name="socket1" port_id="A2">
      <ibis:ref_port component="ibis_die" pin_name="3"
      terminal_type="Pad_I/O" />
   </connection>
   ...
</reference>
```

Feedback from early adopter

Several parts vendors start adopting the format to provide their product specification library. Their suggestions follow below.

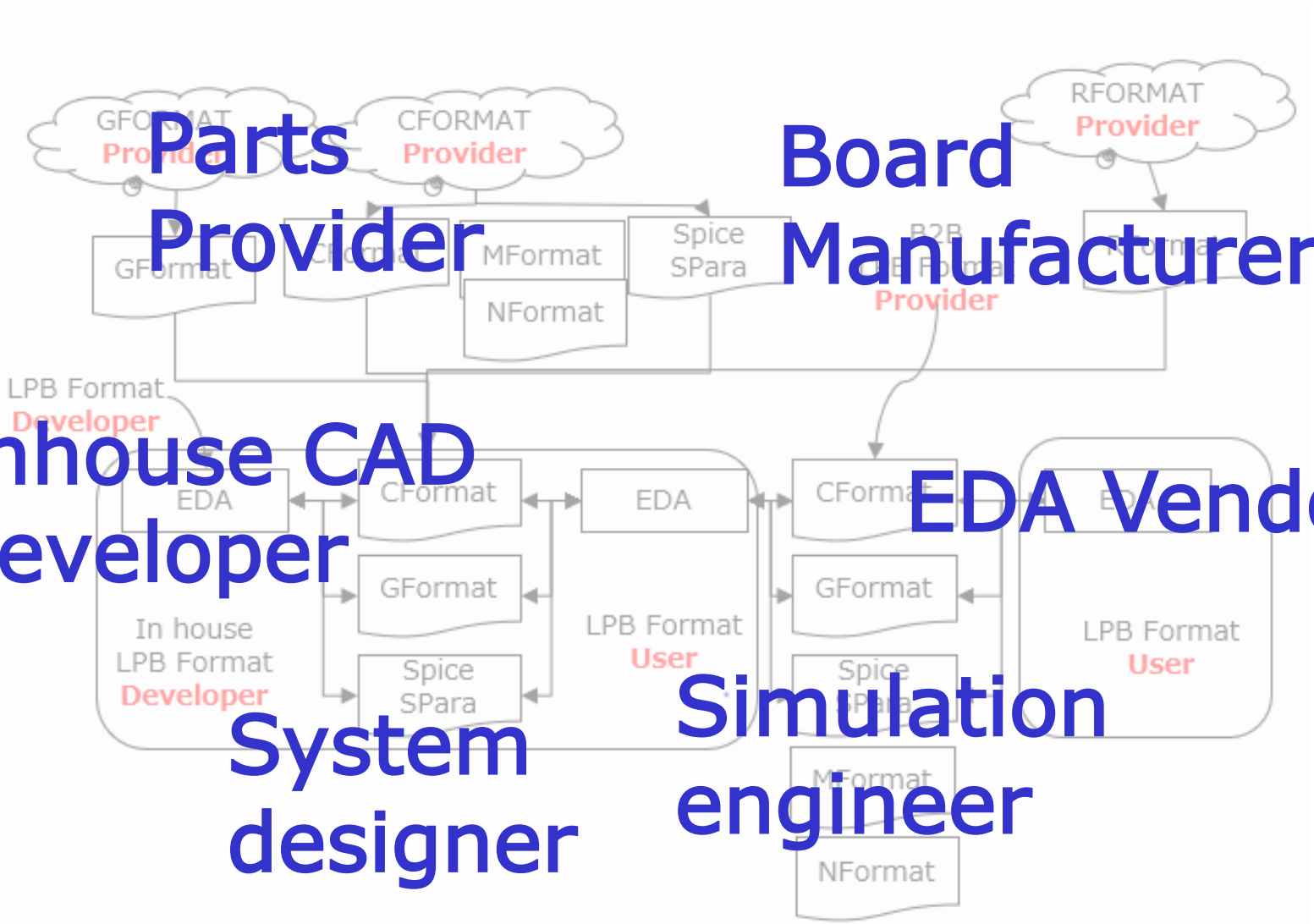
"It would be nice to have a textbook with a specific scope for user purpose."

- Which part of the format shall I use to express passive component data for simulation?
  - Physical shape, electrical models, how to combine them, …
- I created data. I want to check if it is made correctly.
  - What's the point? Are there any tools to check?
- . . .

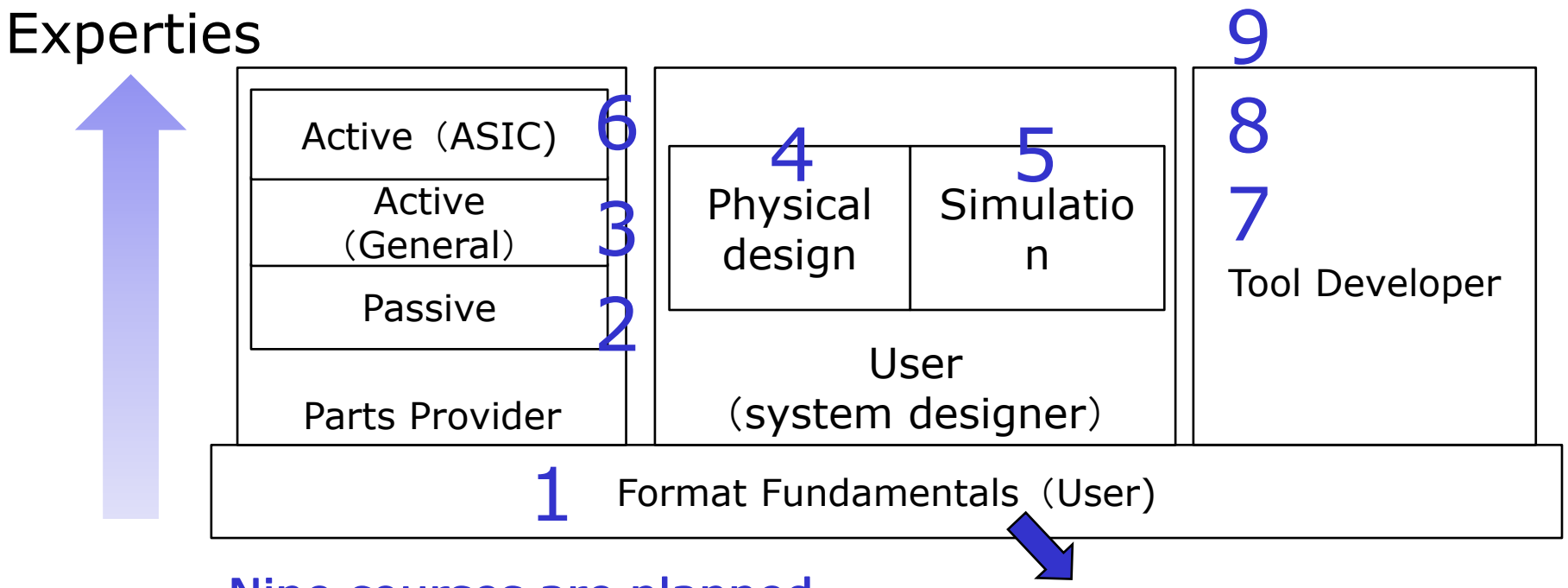
EDUCATON COURSE PLANNING FOR IEEE2401

to accelerate format utilization among players

LPB Format Users



Educational course



Nine courses are planned.

http://jeita-sdtc.com/en/committee-activity/lpbintrface-wg/jeita-lpb-stdformat/

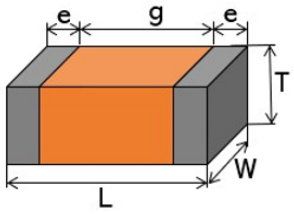
Every course includes

- **Fundamentals of IEEE2401 Format**
- **Training session**

Sample of textbook

2.1 Capacitor

In this section, we will look at the simplest C-Format using Murata's chip capacitor (GRM21BB30J226ME38) as an example.



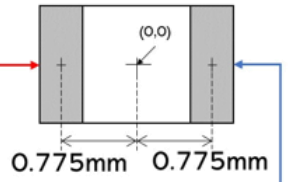
L size	2.0mm
W size	1.25mm
T size	1.25mm
External electrode size e	0.2~0.7mm
External electrode distance g	0.7mm
Size code	2012M

The following is an example of the GRM21BB30J226ME38 C format. In this C format, the footprint of the part and the SPICE model (S parameter) are linked. Below, we will look at the details of this C format.

```
<?xml version="1.0" ?>
<LPB_CFORMAT version="2020">
  <header design_revision="1.0" project="GRM"
          company="MURATA" date="Wednesday Dec. 19 2018"/>
  <global>
    <unit> <distance unit="mm"/> <capacitance unit="uF"/> </unit>
    <shape>
      <rectangle id="1" height="1.25" width="2"/>
      <rectangle id="2" height="1.25" width="0.45"/>
    </shape>
```

Sample of textbook

```
<?xml version="1.0" ?>
<LPB_CFORMAT version="2020">
 <header ... />
 <global>
  :
 </global>
 <module name="GRM21BB30J226ME38" .... >
  <size_code imperial="0805" metric="2012"/>
  <socket name="pins">
   :
   <port id="1" x="-0.775" y="0.0"/>
   <port id="2" x="0.775" y="0.0"/>
  </socket>
   :
  <reference xmlns:spice="http://www.jeita.or.jp/LPB/spice"
         format="SPICE"
         reffile="GRM21BB30J226ME38.mod">
   <connection socket_name="pins" port_id="1">
    <spice:ref_port subckt="GRM21BB30J226ME38" portid="1"/>
   </connection>
   <connection socket_name="pins" port_id="2">
    <spice:ref_port subckt="GRM21BB30J226ME38" portid="2"/>
   </connection>
  </reference>
   :
 </module>
</LPB_CFORMAT>
```




```
.SUBCKT GRM21BB30J226ME38 Port1 Port2
  C01 Port1 N01 1.41e-05
  R01 Port1 N01 2.27e+06
  L02 N01 N02 6.91e-11
  R03 N02 N03 2.43e-03
  C04 N03 N04 2.83e-04
  R04 N03 N04 2.01e+01
  C05 N04 N05 3.85e-04
```

Conclusion

- IEEE-2401-2019 has been published as a new version of LPB format
- IEEE-2401-2019 can indicate “Interconnect Model” in IBIS Version 7.0
- JEITA LPB working group is preparing education course for IEEE-2401-2019 to accelerate utilization of this format

Thank you!