Model Management
...drivers

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Requirements/Systems Engineering

First job out of college…

Siemens PLM Software

Apollo Moon rockets vs. Gift Cards
Accelerating complexity…

Apollo Guidance Computer (1966)
- 1st IC-based computer
- 2k core, 36k 'rope' memory
- 11.72 micro-second cycle
- 55 Watts
- 70 lbs
- 24" x 12.5" x 6.5"
- $$$$$$$$

Hallmark Card (today)
- 256mb+ memory
- ~2 ghz
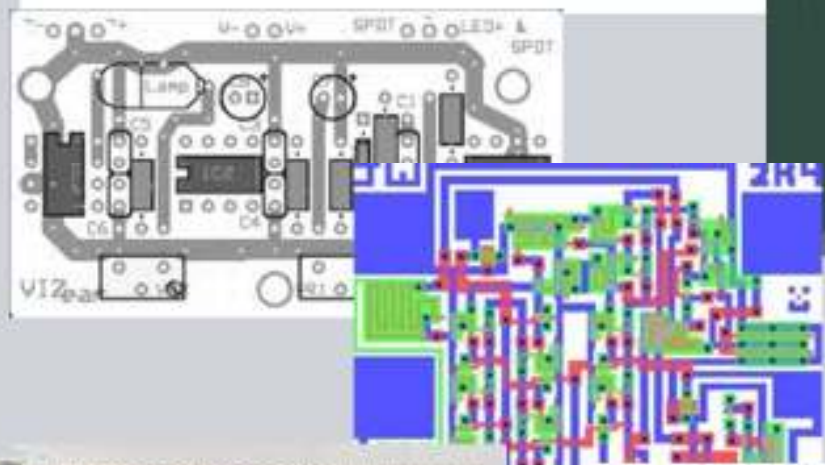- 1900 mAh (2 yrs)
- .085 oz
- 1" x 1" x .25"
- .$ <$1

{Mom}, for all the ways you

Thought we forgot?...never!
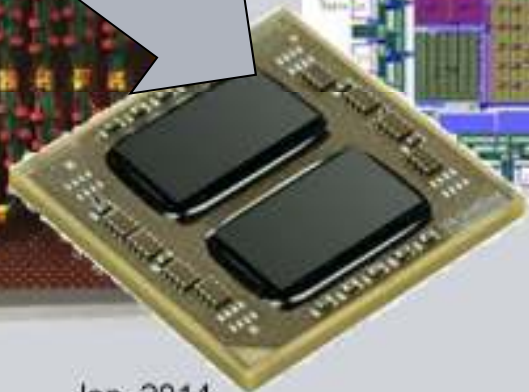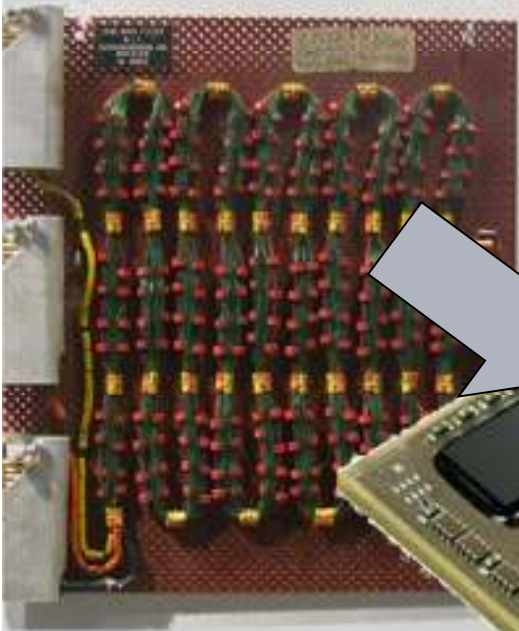HAPPY BIRTHDAY

This requires tools to support the change…

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Paper

CAD

Model-libraries

HDL

Page 3   Jan. 2014

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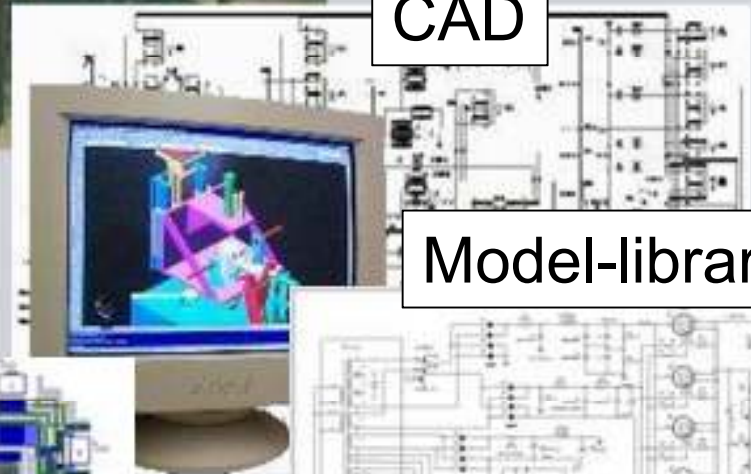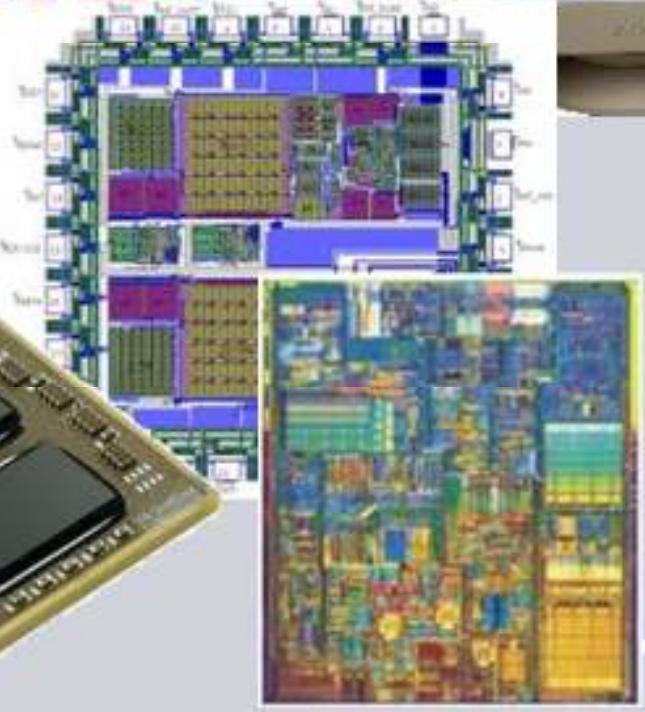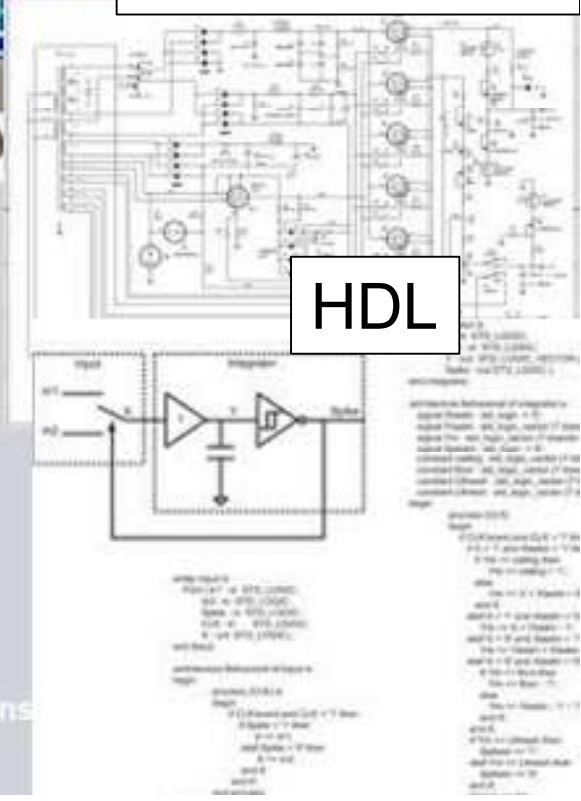
Tools/technologies drive down-stream processes

Microfilm

Paper

Data Storage/PDM

CAD

Library/CM

Component libraries

Simulation

HDL

Jan. 2014

Siemens PLM Software
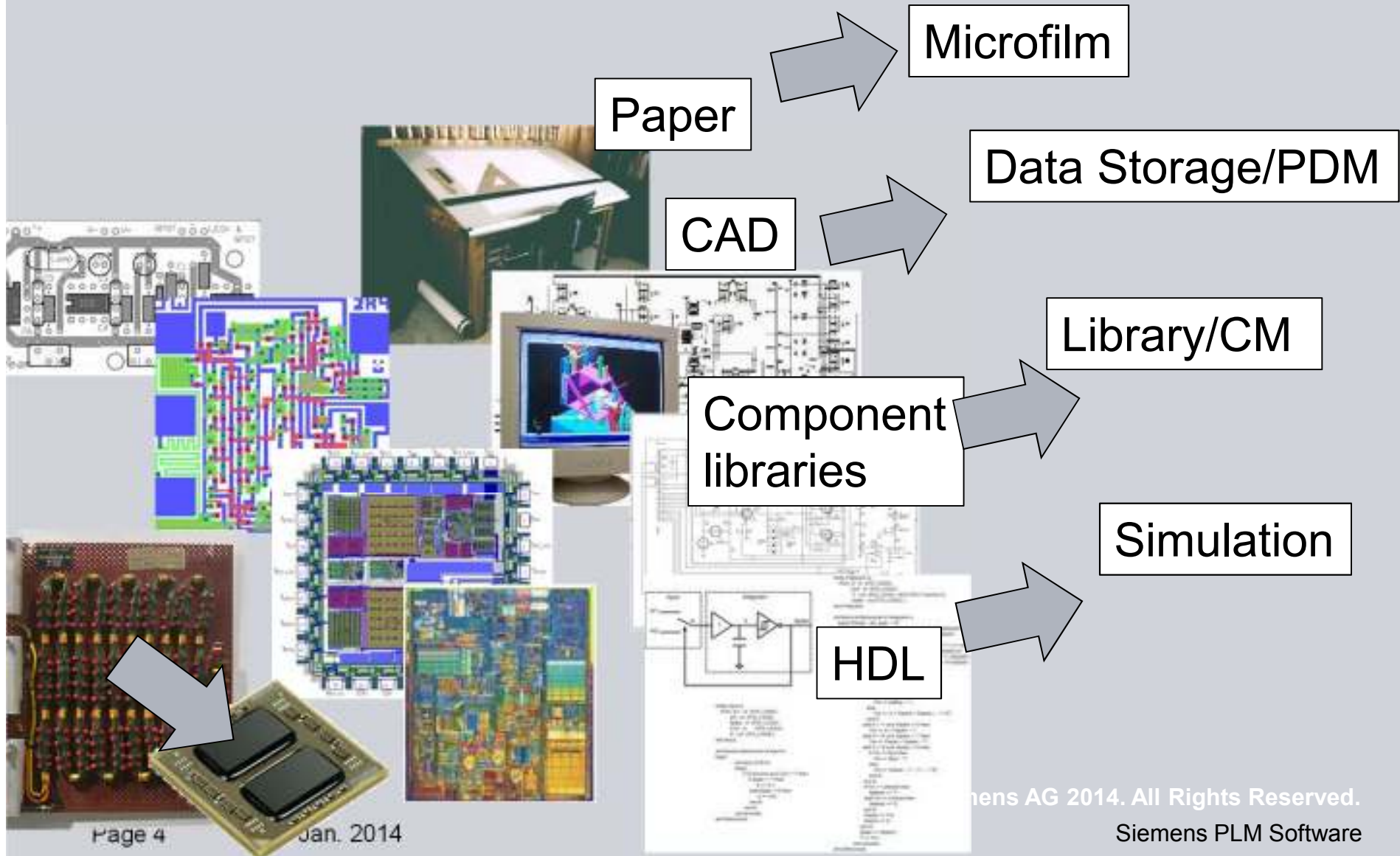
Demanding higher development maturity…

Paper → Microfilm → Legacy Data Migration

CAD → Data Storage/PDM → Product Line Big Data

Component libraries → Library/CM → Features / Variants

HDL → Simulation → Thermal / EMI/EMC / Reliability / Test

Page 5   Jan. 2014
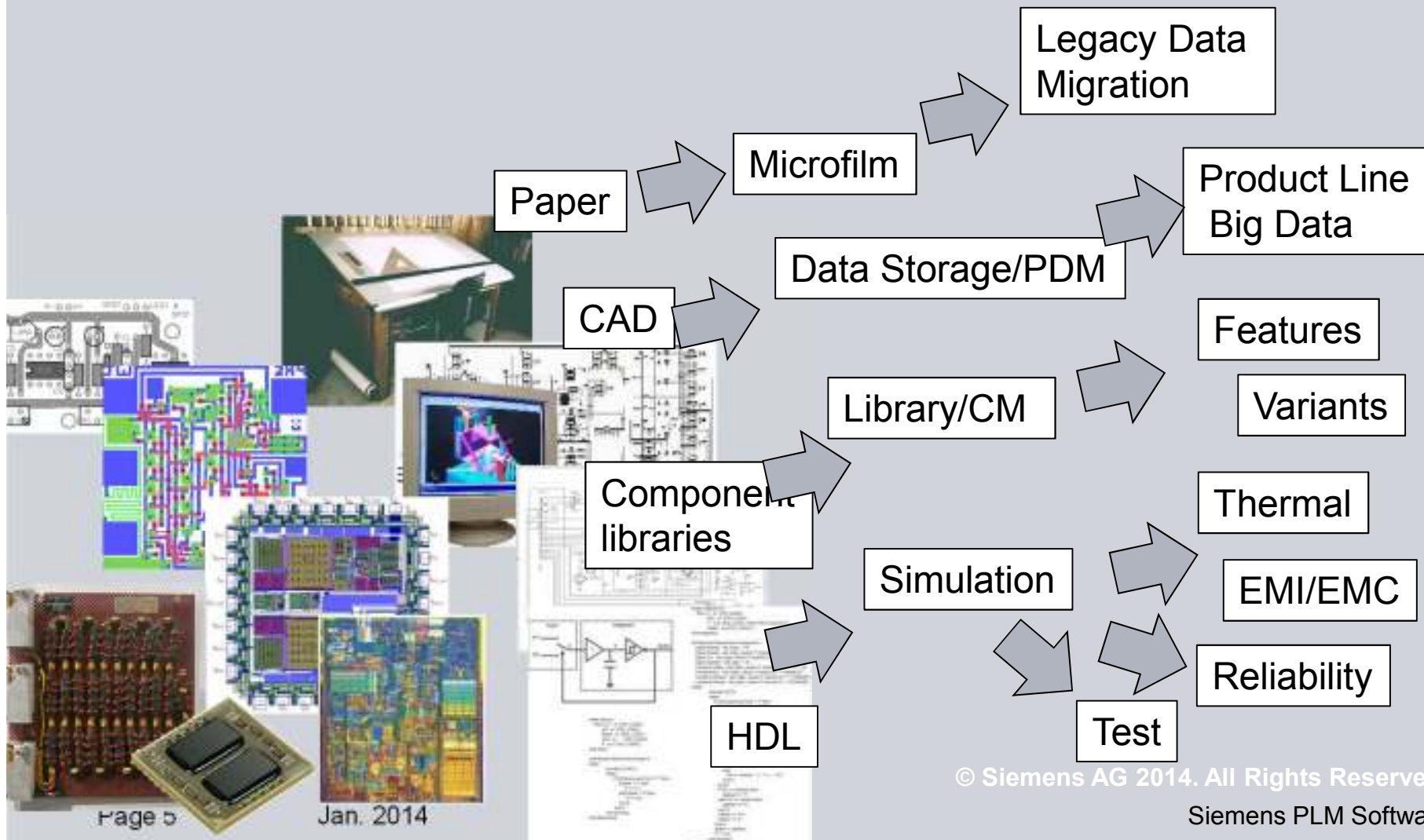
Leading to 'big picture' thinking…

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… Suppliers
Logistics

Regulations

Legacy Data Migration

Paper

Microfilm

Product Line Big Data

CAD

Data Storage/PDM

Manufacturing

Features

Library/CM

Variants

Component libraries

Thermal

Simulation

Test

Maint Warranty

HDL

Reliability
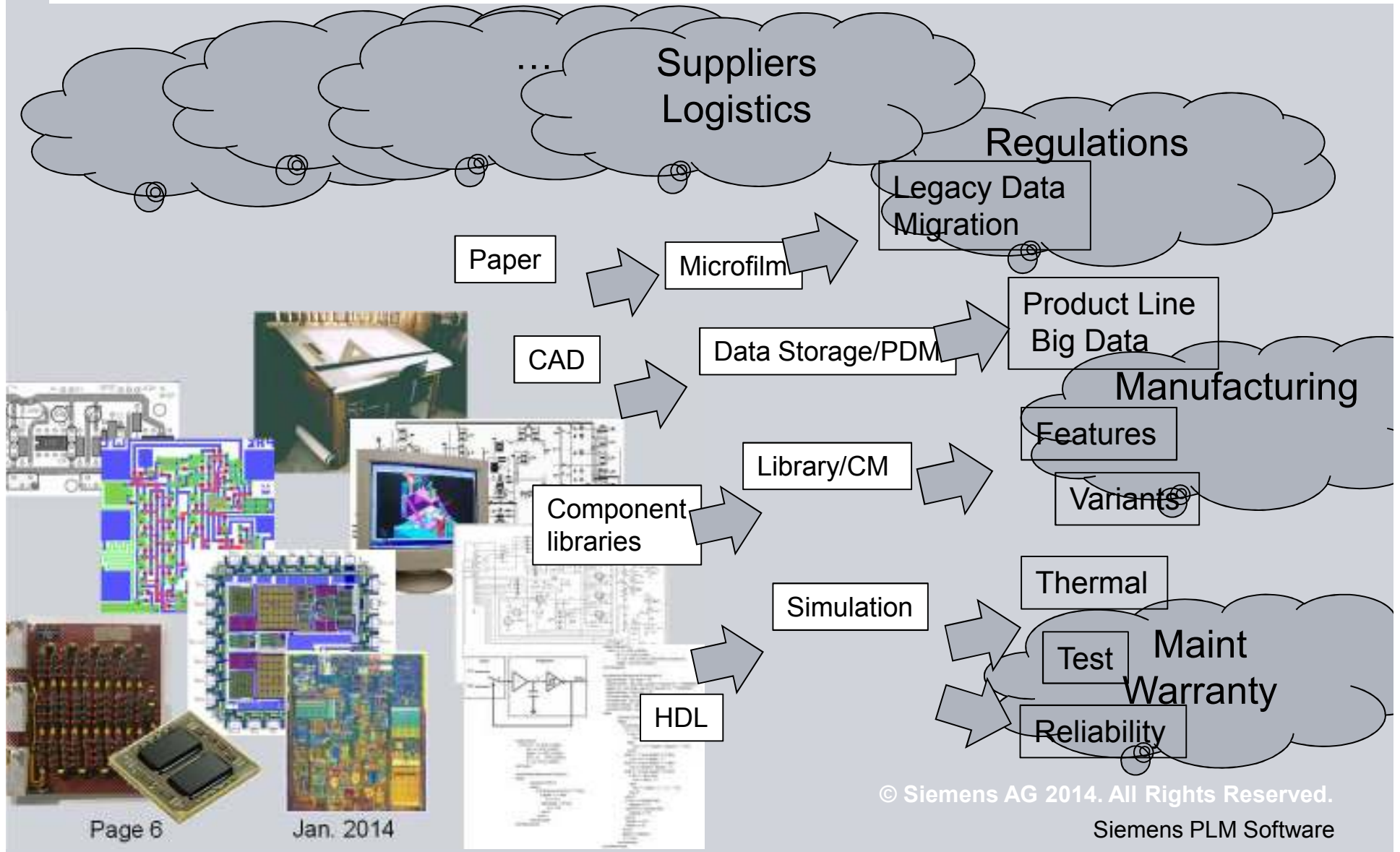
Model Maturity thinking…

… Suppliers Logistics

Regulations

Paper → Microfilm

CAD → Data Storage/PDM → Product Line Big Data

Manufacturing.

Features

Variants

L-5

Component libraries → Library/CM

L-4

Thermal

L-3

Simulation

Test

Maint Warranty

L-2

HDL

L-1

Level 5 thinking:
- Lean Requirements
- Test is waste

Page 7   Jan. 2014
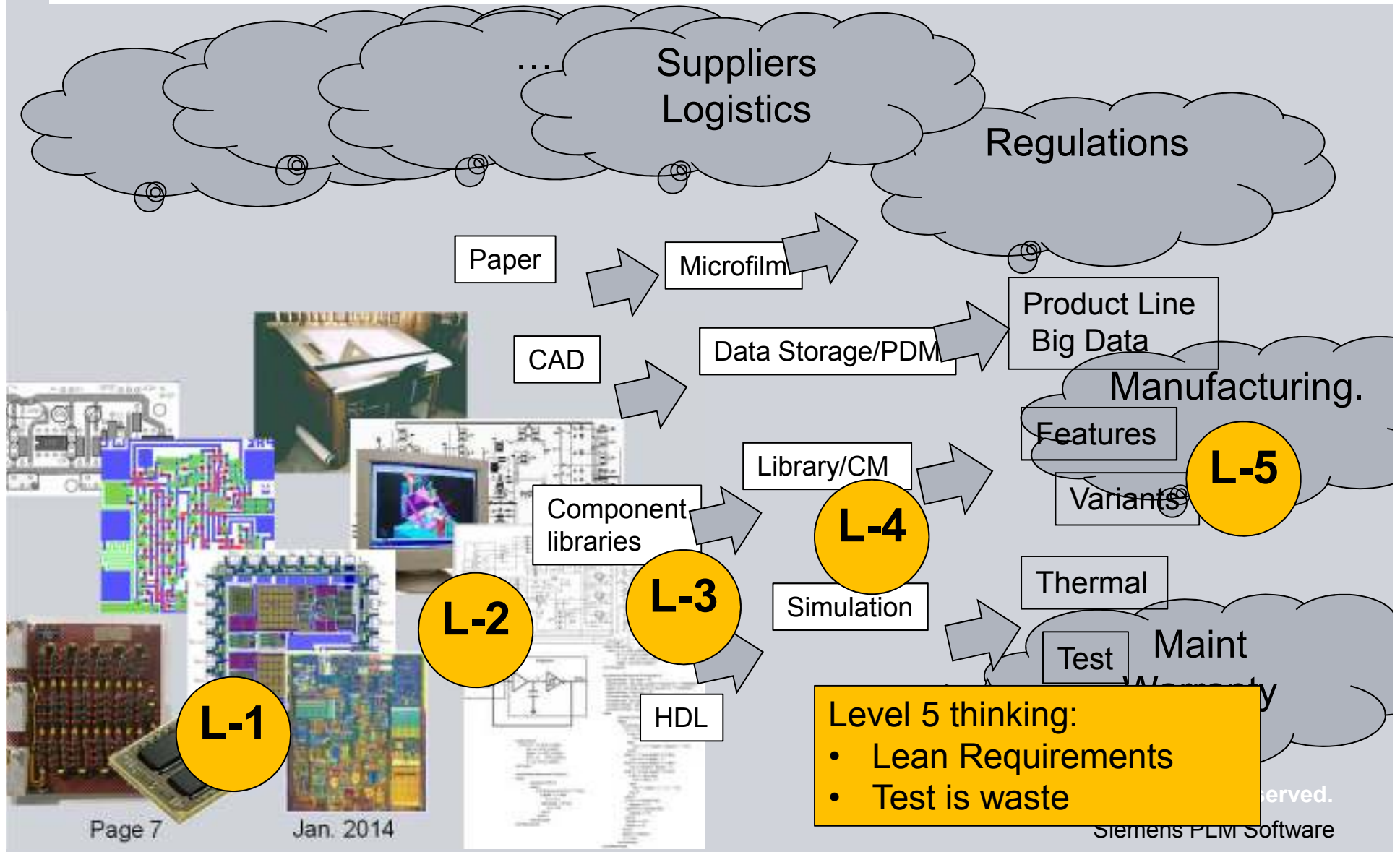
Level 5 cross-domain Model Management
Extend PLM across the enterprise

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... Suppliers Logistics

Product Line Thinking

Paper

Microfilm

CAD

Data Storage/PDM

Product Line Big Data

Manufacturing.

Features

L-5

Variants

Component libraries

Library/CM

L-4

L-3

Thermal

L-2

Simulation

Test

Maint Warranty

L-1

HDL

Level 5 thinking:
- **Lean Requirements**
- **Test is waste**

Page 8   Jan. 2014

...served.

Siemens PLM Software
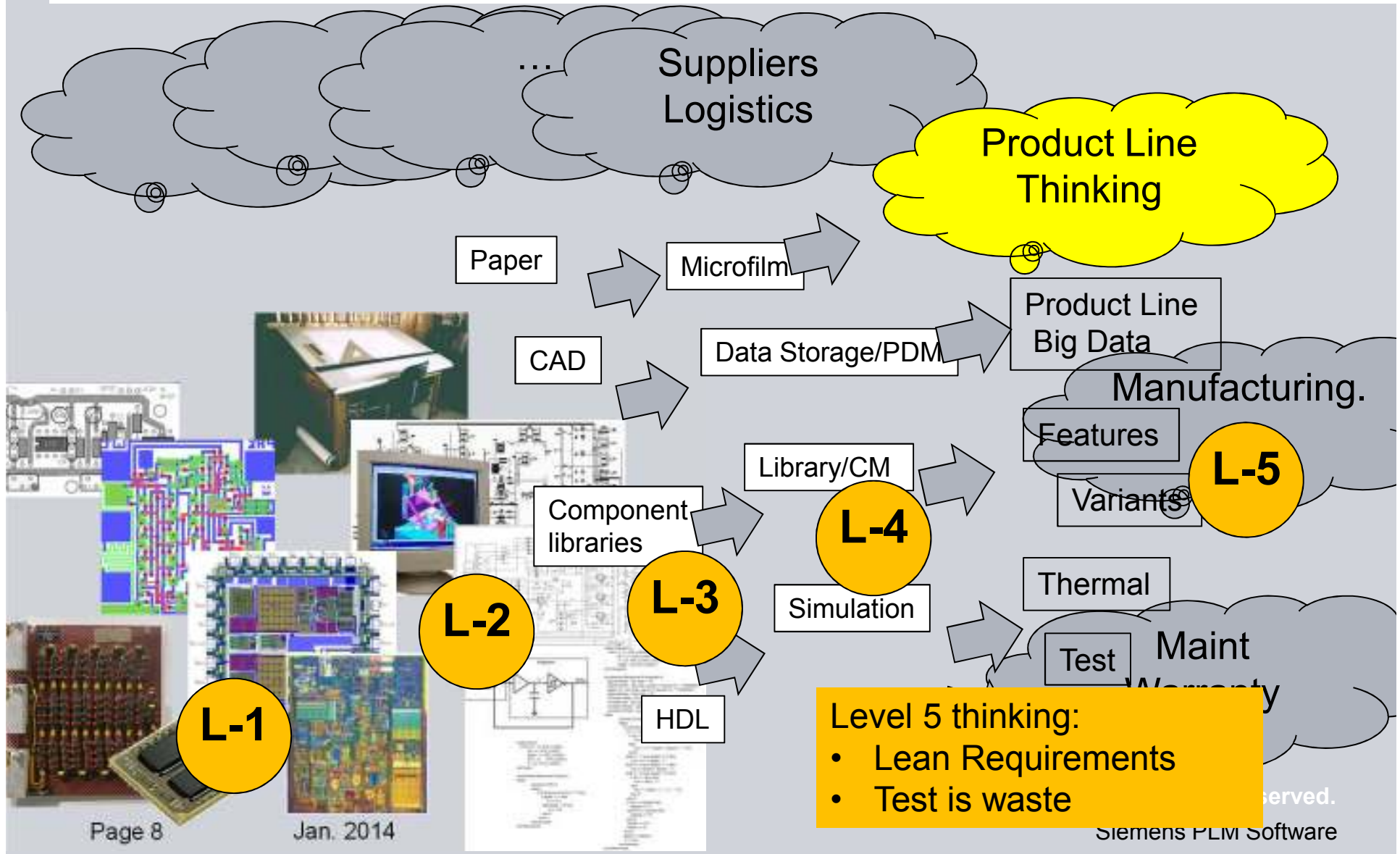
PLM journey to level 5…
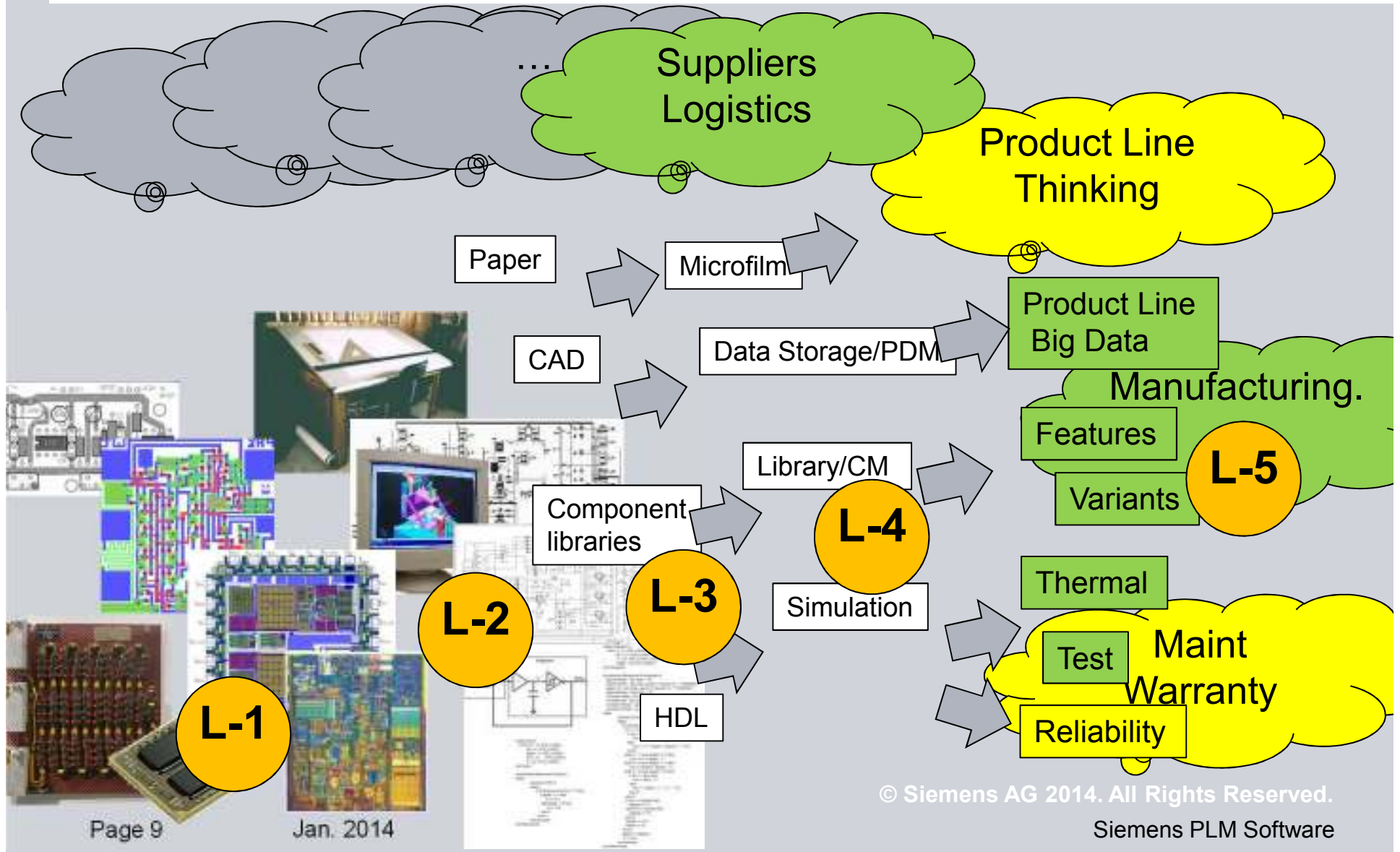
ROI: Text vs Models…

Alabama	Mississippi
Alaska	Montana
Arizona	Nevada
Arkansas	New Hampshire
California	New Jersey
Colorado	New Mexico
Connecticut	New York
Delaware	North Carolina
Florida	North Dakota
Georgia	Ohio
Hawaii	Pennsylvania
Idaho	Rhode Island
Kansas	South Carolina
Kentucky	Tennesee
Louisiana	Texas
Maine	Utah
Maryland	Vermont
Massachusetts	
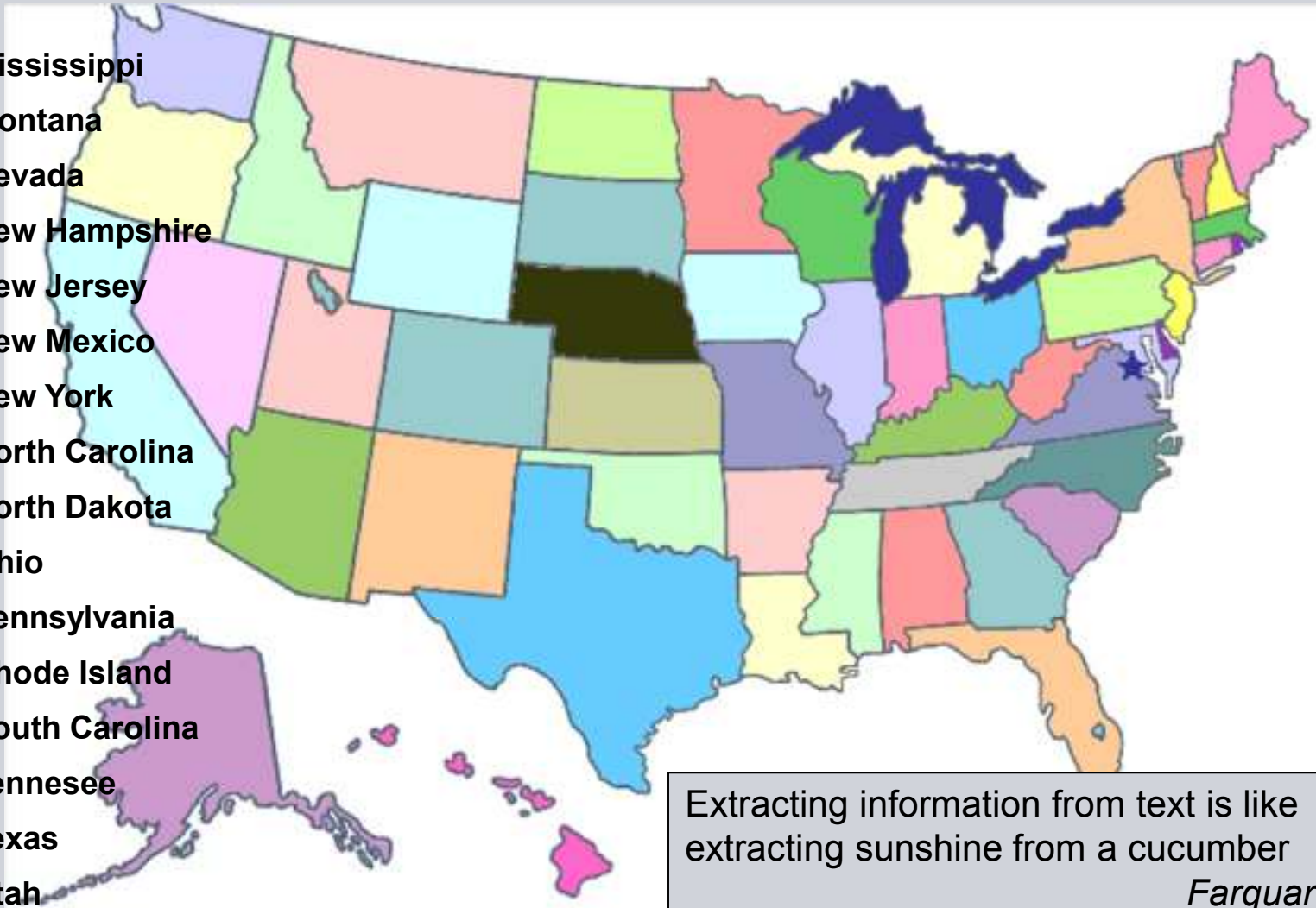
> Extracting information from text is like extracting sunshine from a cucumber
>
> *Farquar*

Justification: Paper/text is not scalable…

- Complex systems are everywhere…
- They are the norm, not the exception
- They require systems/cross-domain thinking to be successful
- Current processes are not scalable to the complexity, magnitude,..
- Failures are expensive
- Model-based systems world is coming
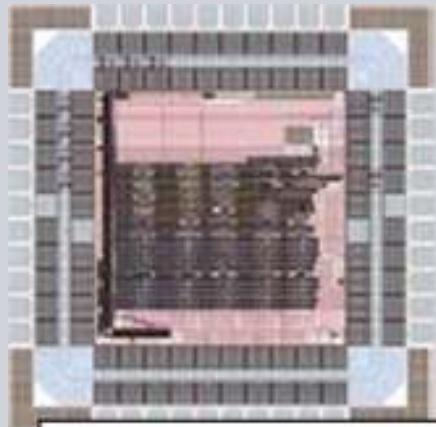
"You're not going to lay out a billion-gate integrated circuit by hand in your life-time" *1972 Dr. Charles Rose at TI (Inventor of HDL's)*

"…no two BMW 5 series sold last year were the same. "

~5000 sensors, ECU's, etc. communicating over 9000 connections via 1,000,000+ types of messages, performing 2000+ functions in triple-redundant, physically separated fashion with each tail number a different configuration

Level 5:
Integrated systems-oriented decision support…

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Minimum Turn Radius: 24 ft.
Dry Pavement Braking Distance
at 60 MPH : ~~110~~ ft. 90 ft

SIEMENS

Thank You

Teamcenter

Enterprise Requirements Management

Enterprise Systems Engineering

Siemens PLM Software