3D Printing and Cybersecurity

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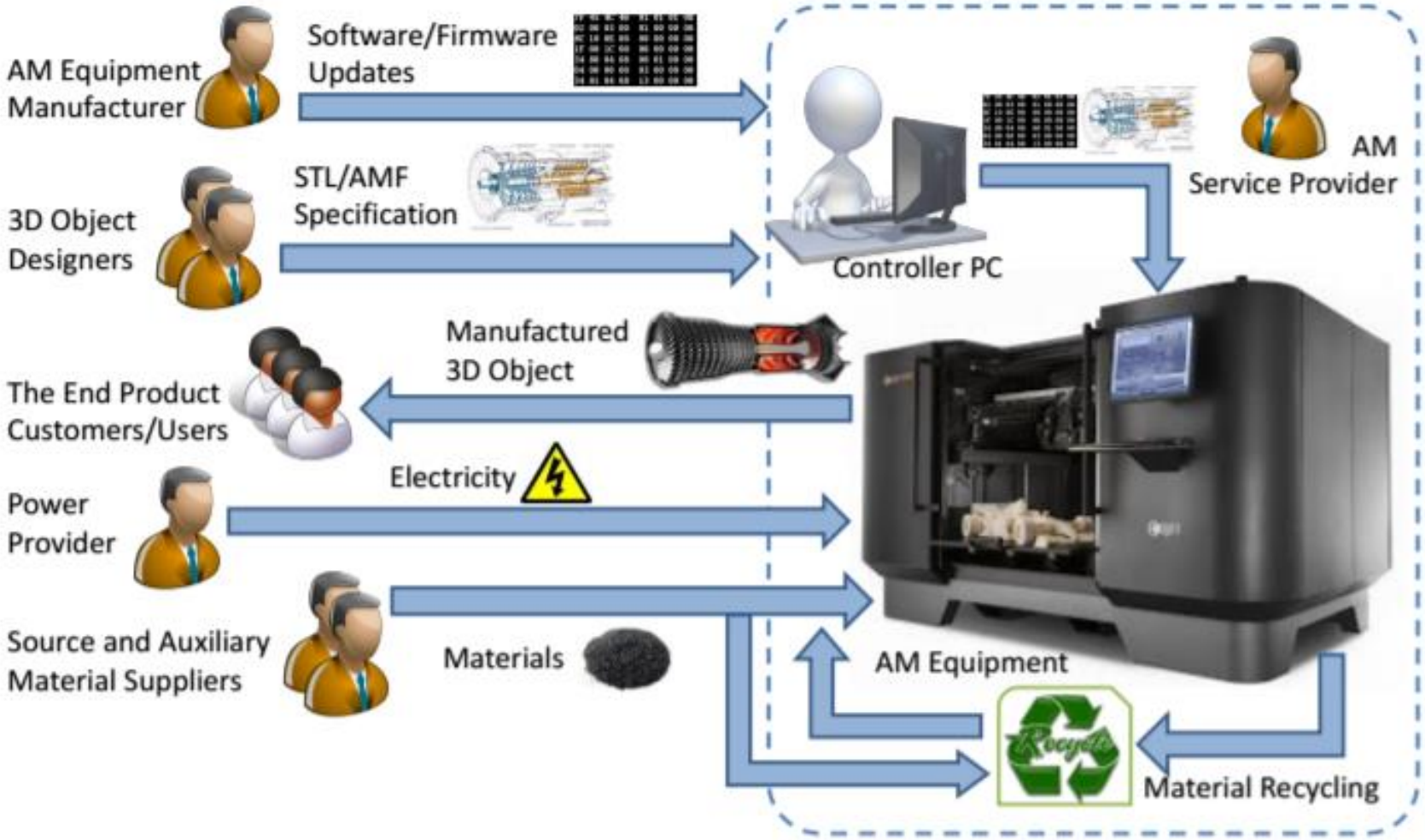
Additive Manufacturing Workflow



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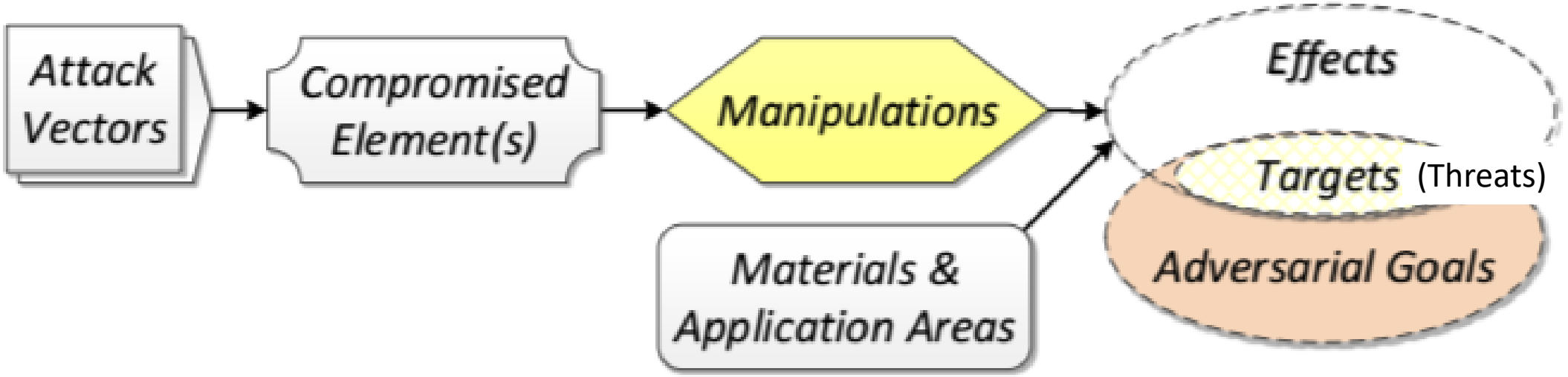
Attack on/with 3D Printer



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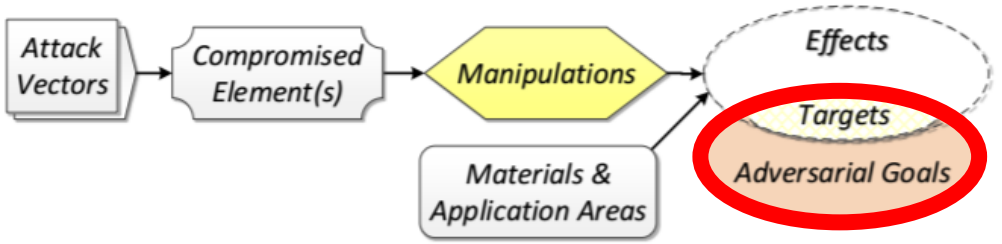


Adversial Goals

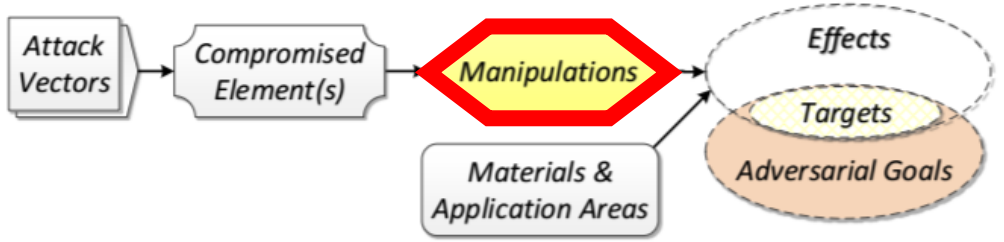
- Sabotage of manufactured part
- Sabotage of the AM printer
- Intellectual property (IP) theft

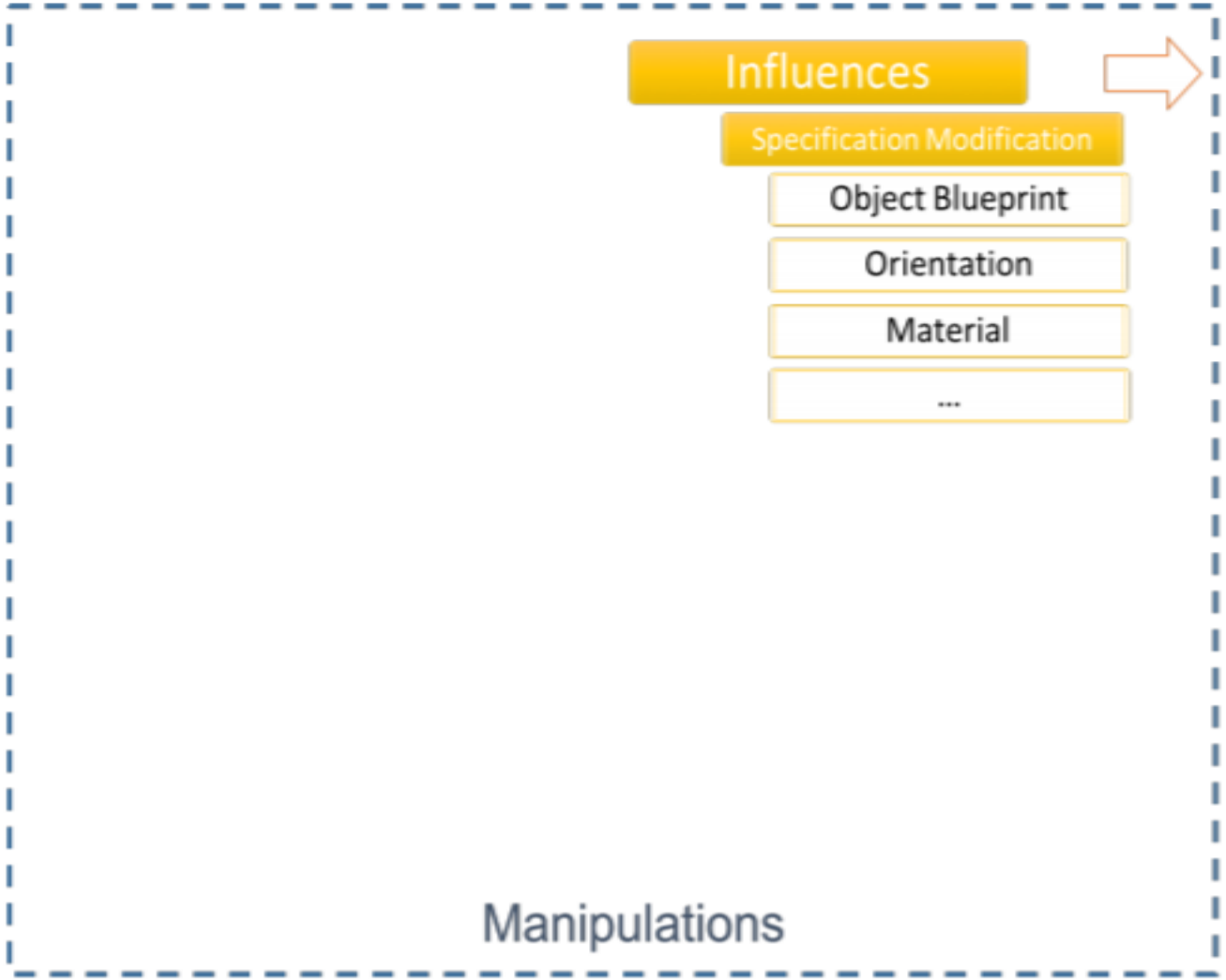
- Can you think of more?

[2]

[8]

Manipulations





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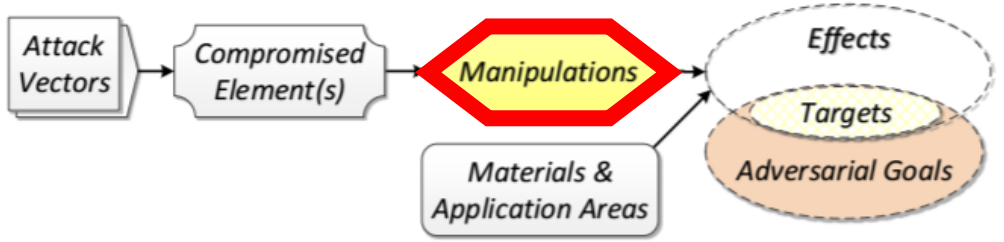

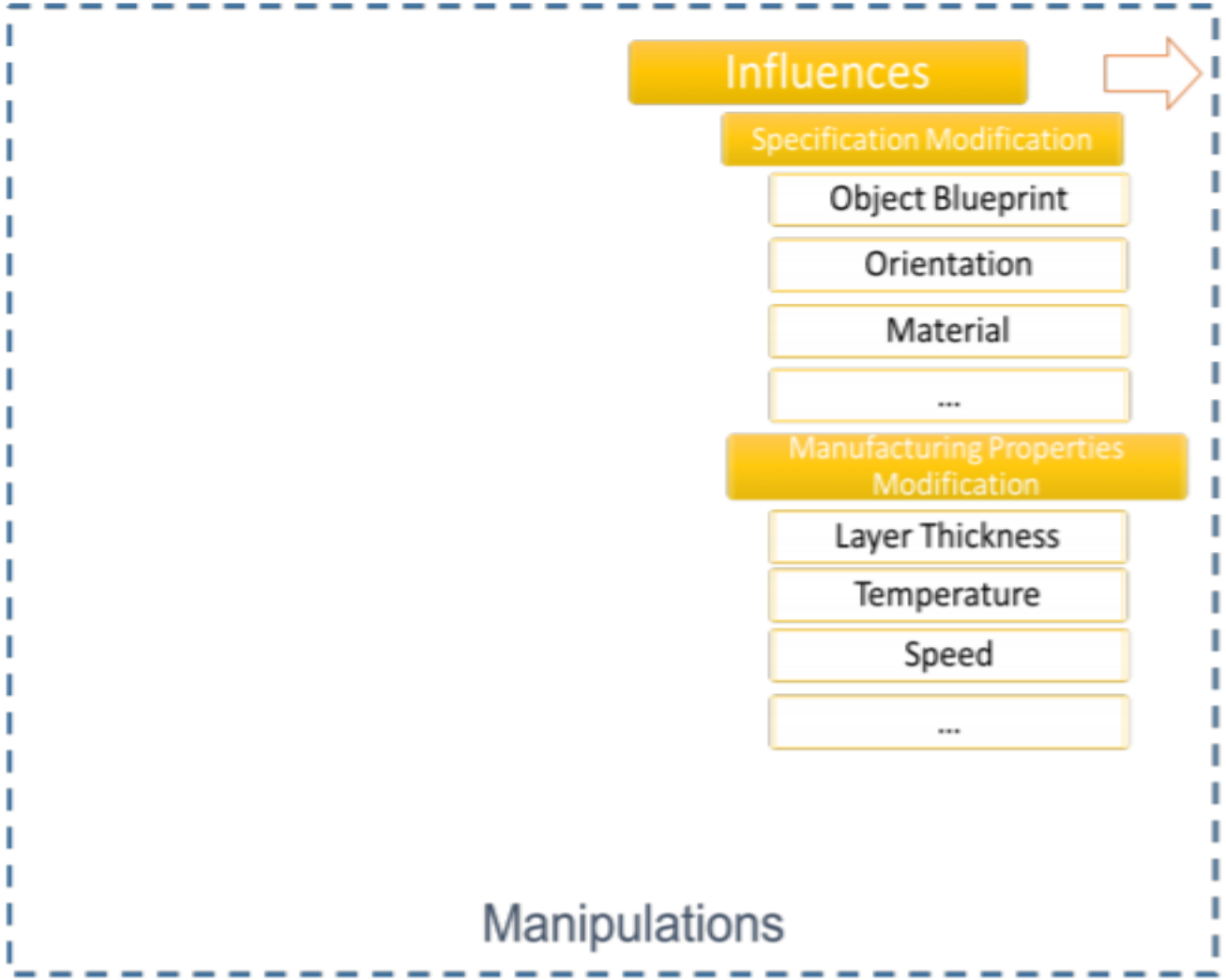

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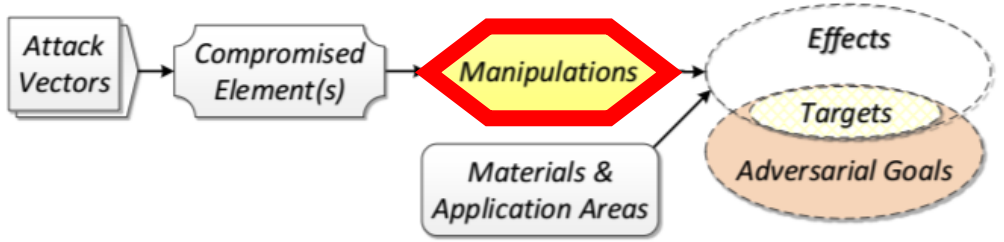

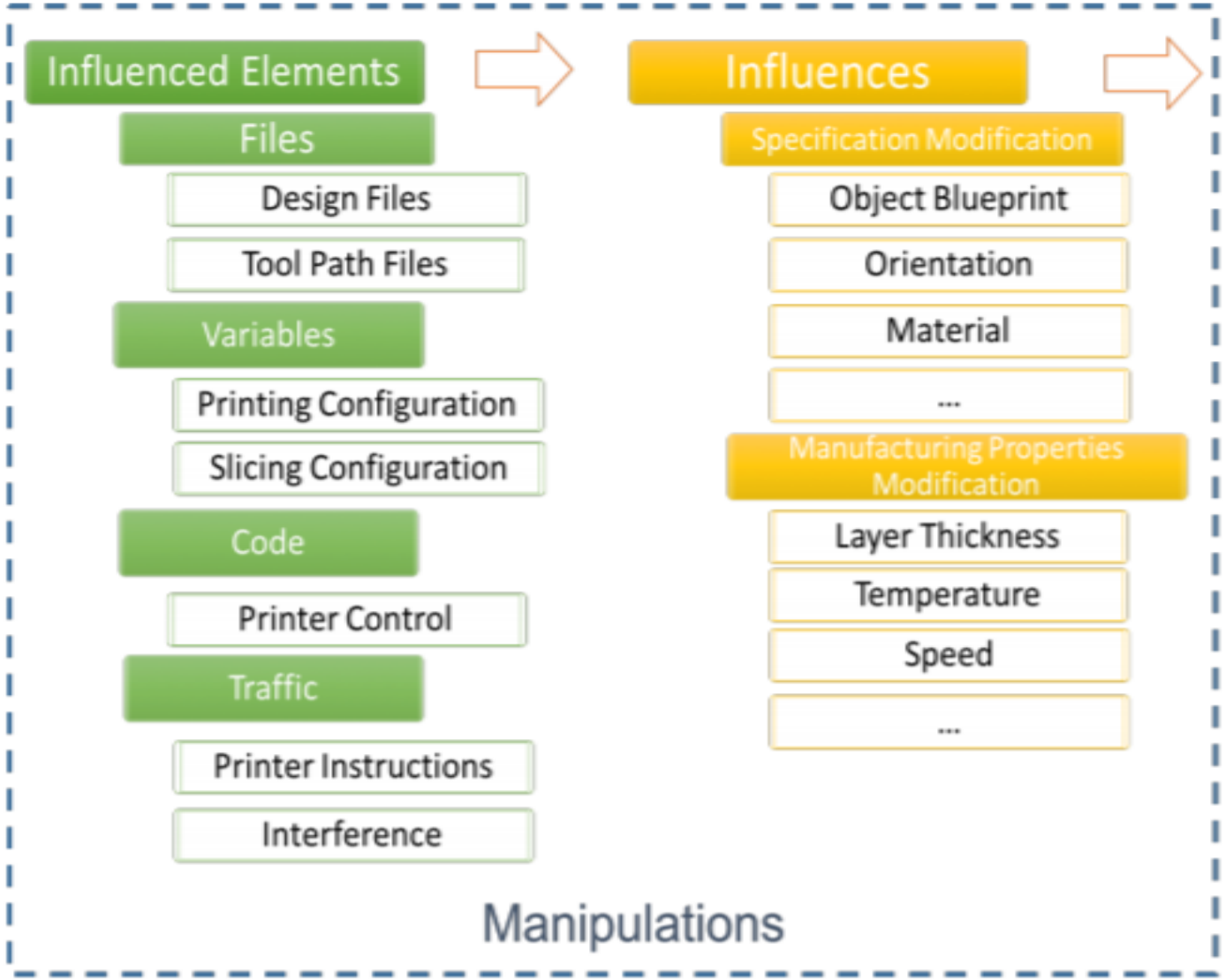

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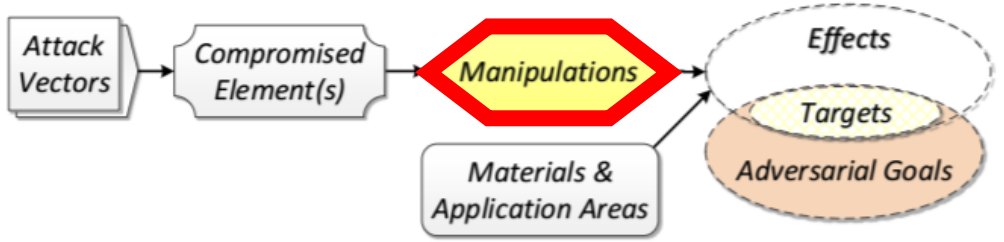

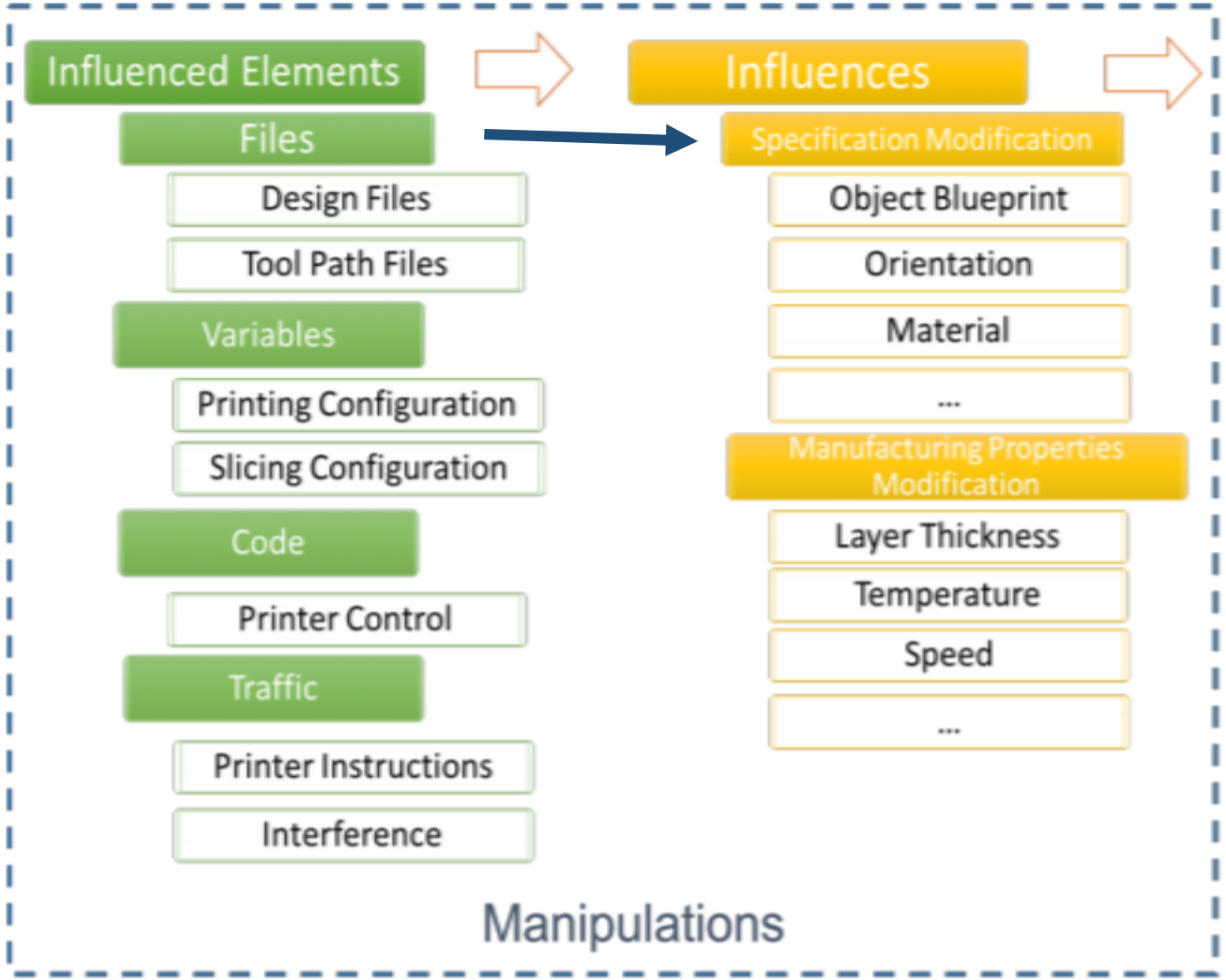

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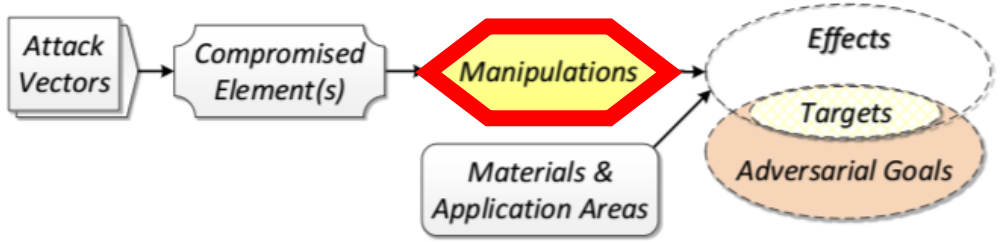

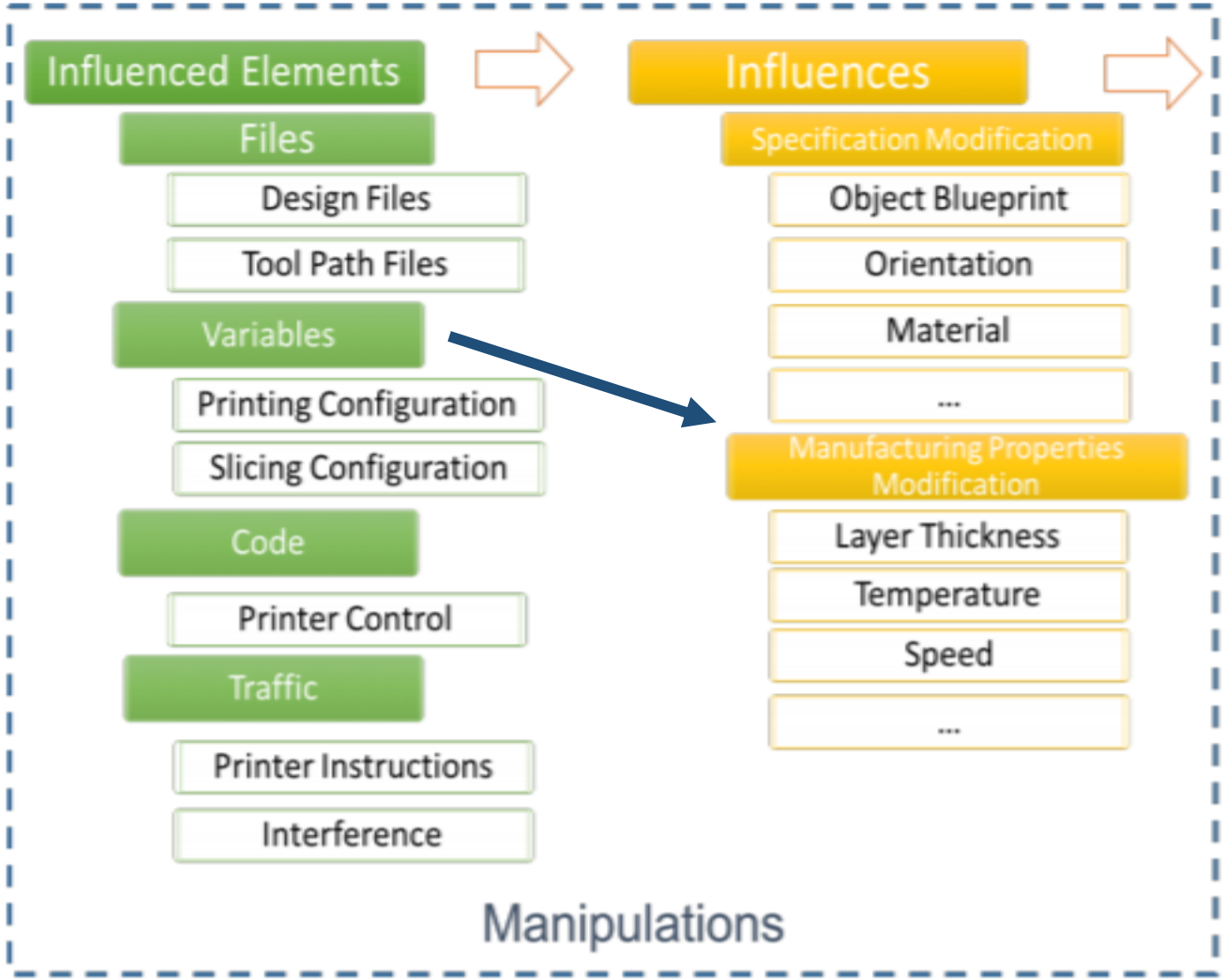

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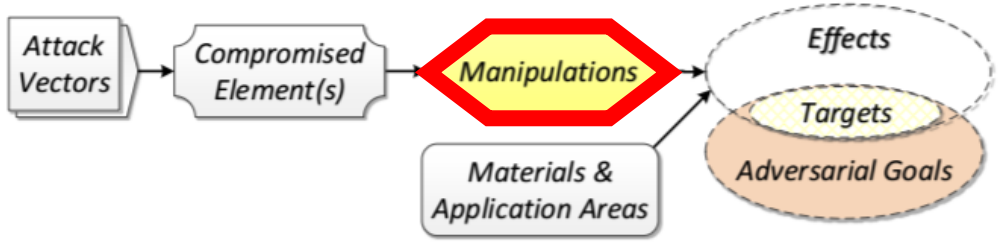

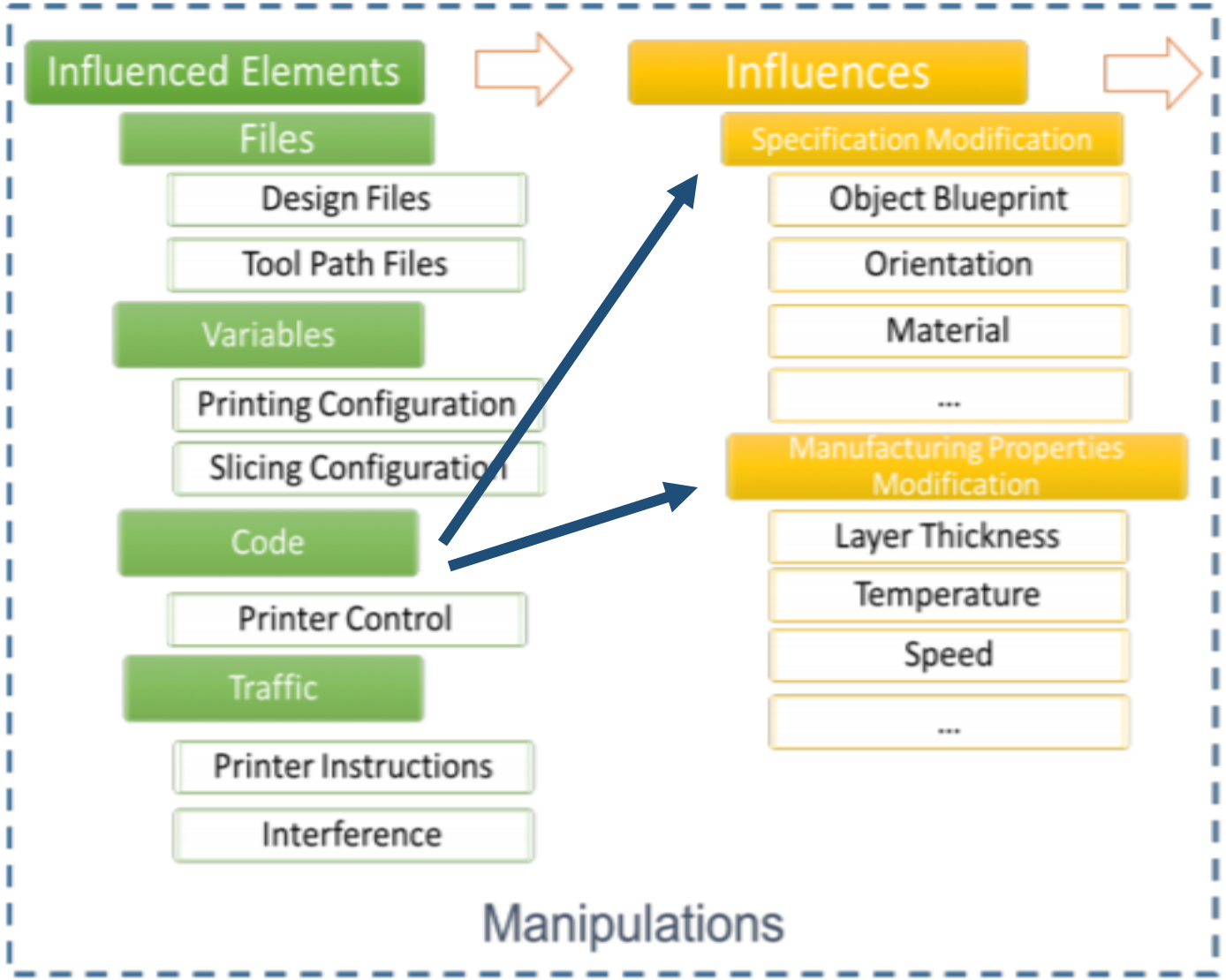

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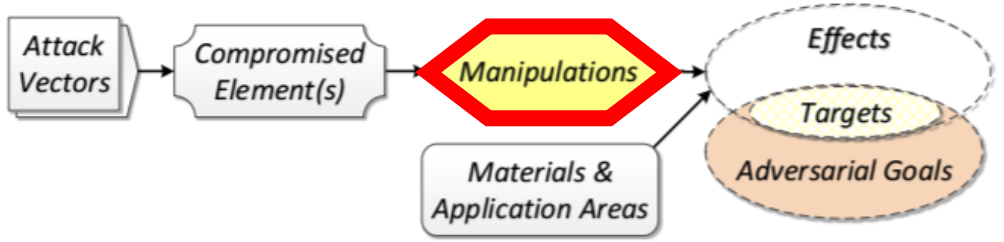

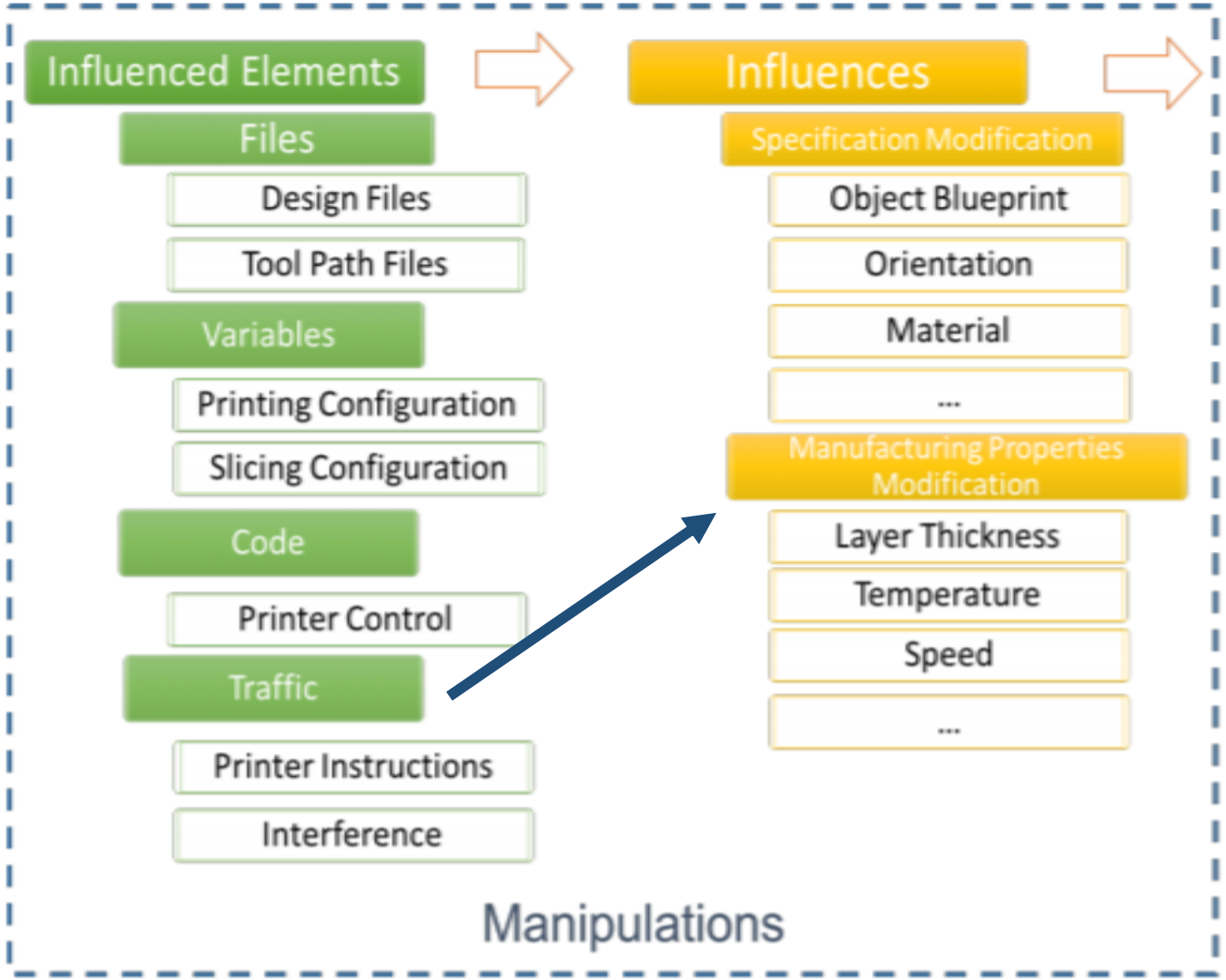

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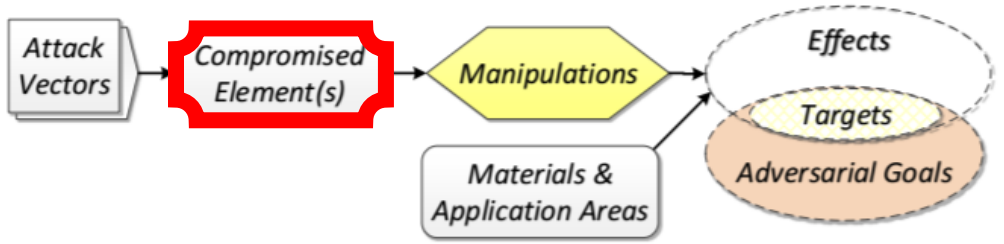

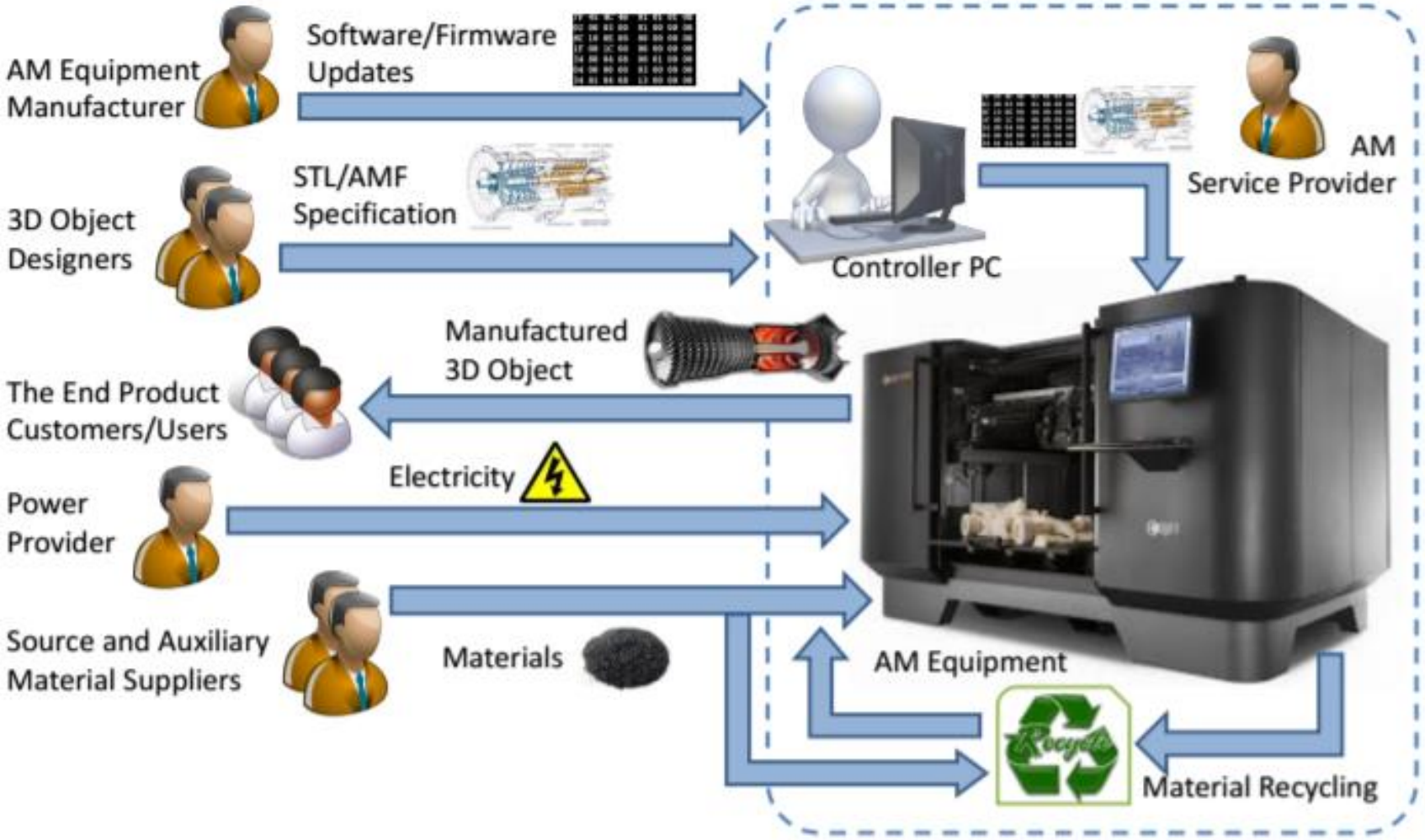

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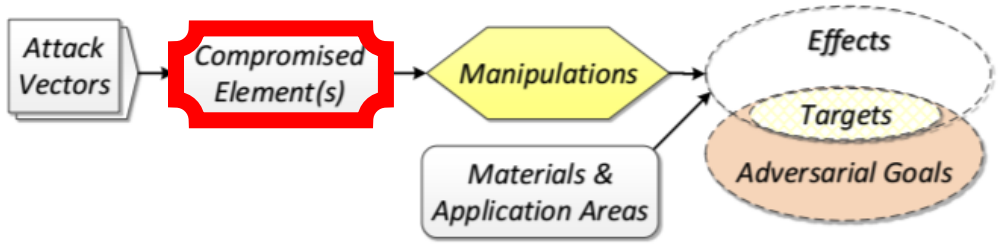

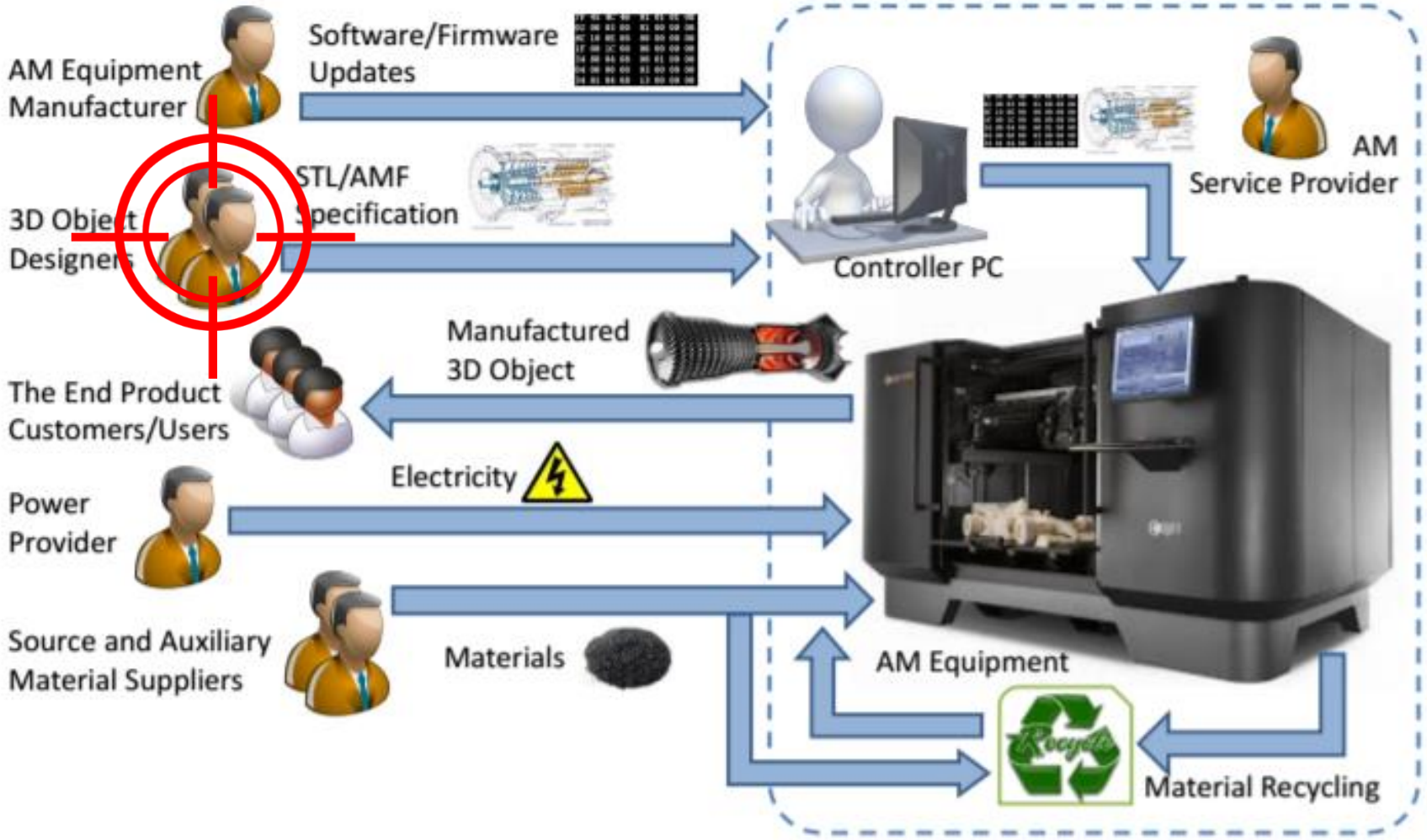

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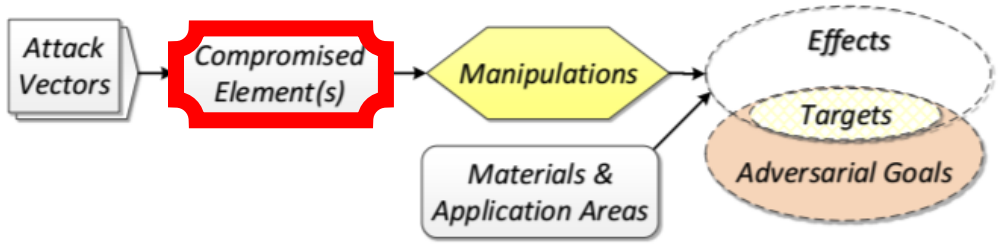

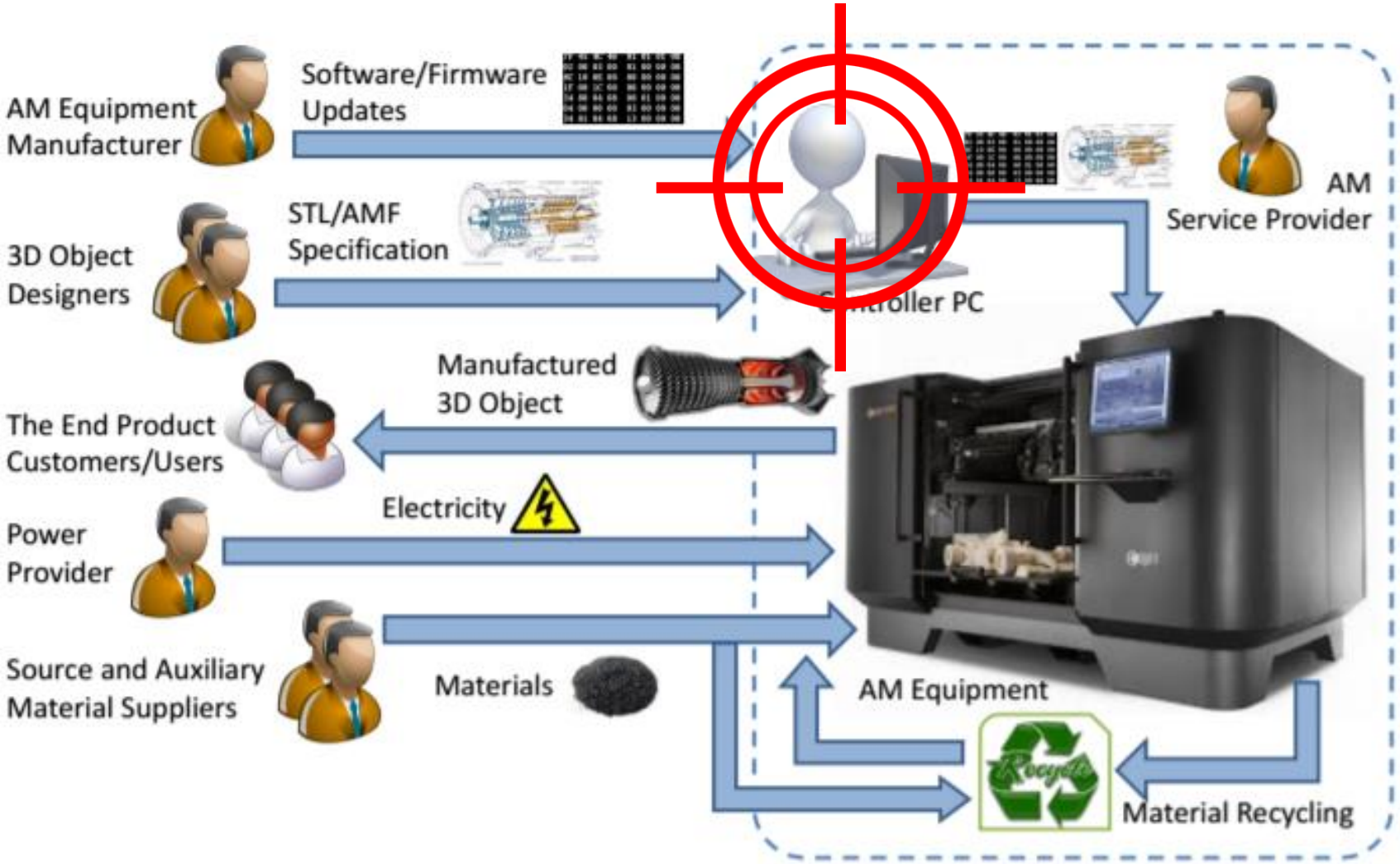

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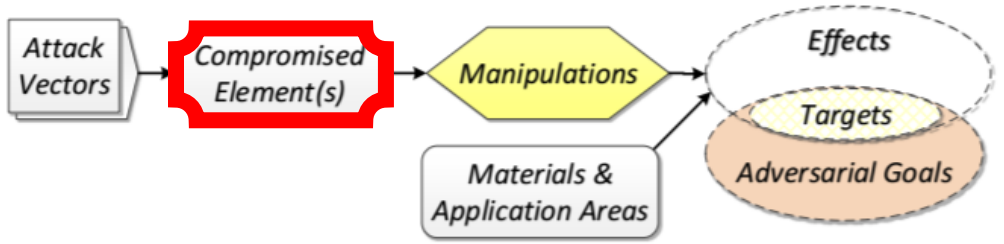

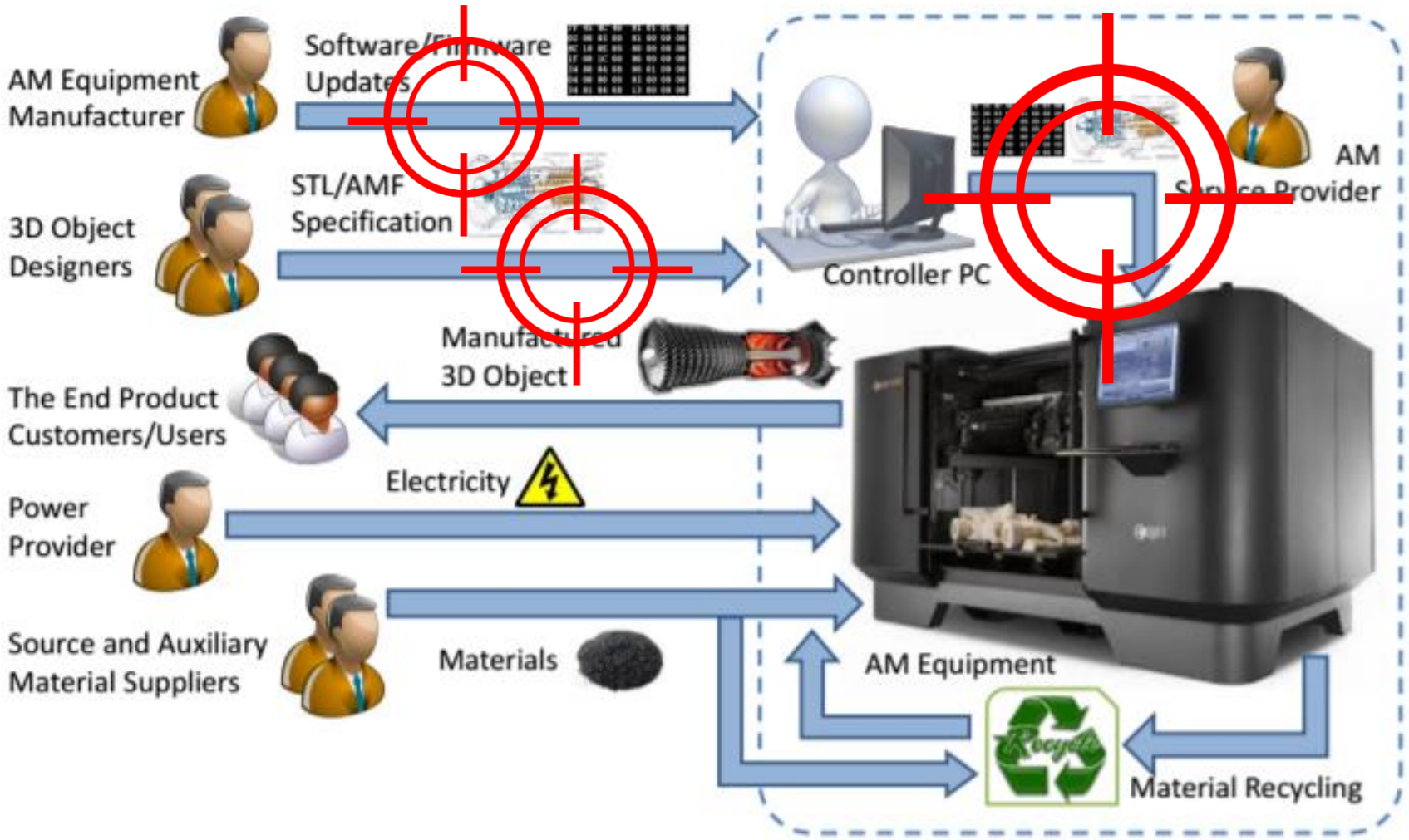

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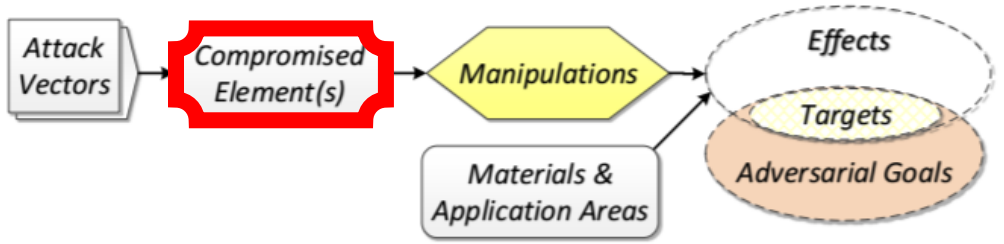

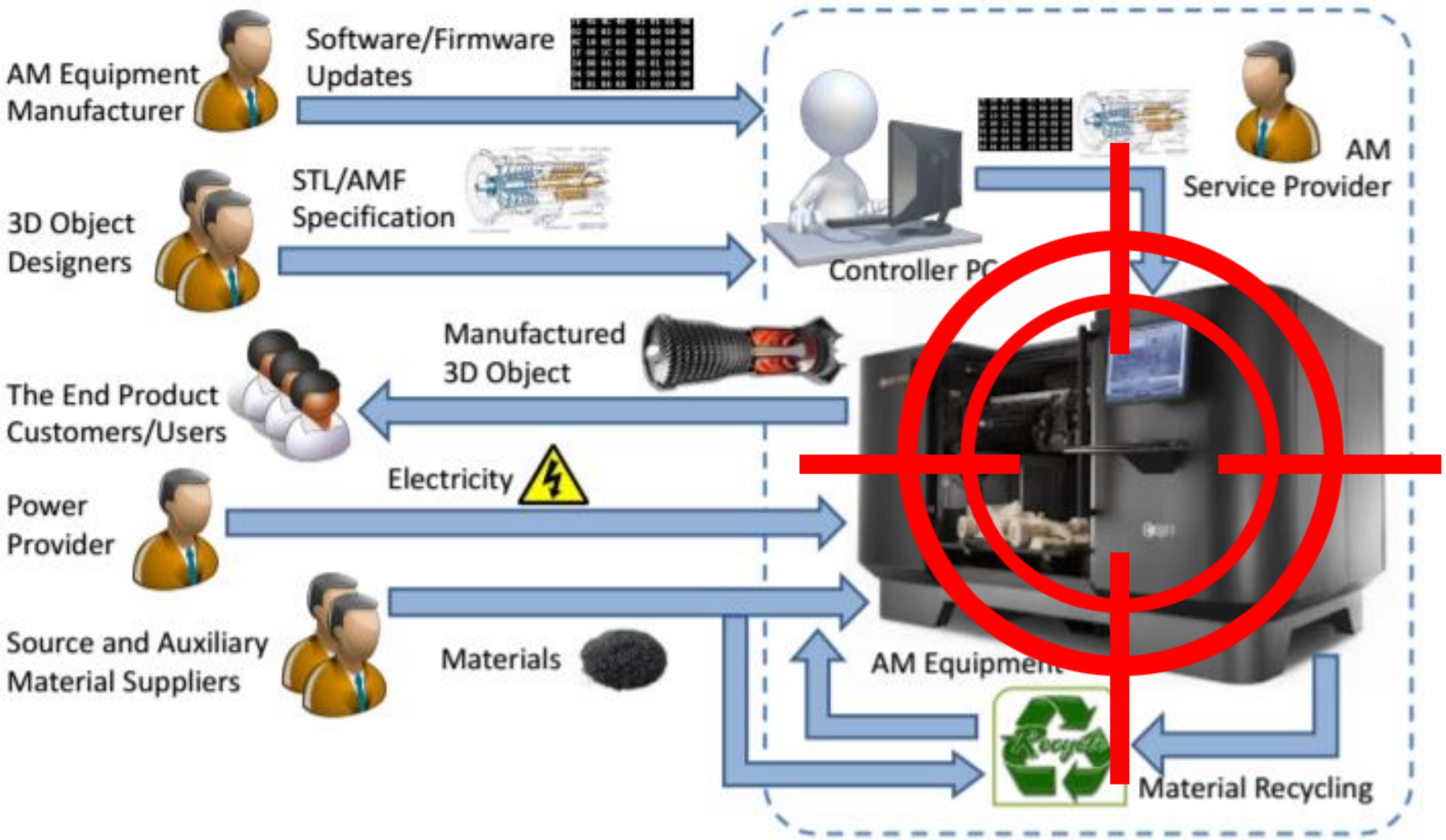

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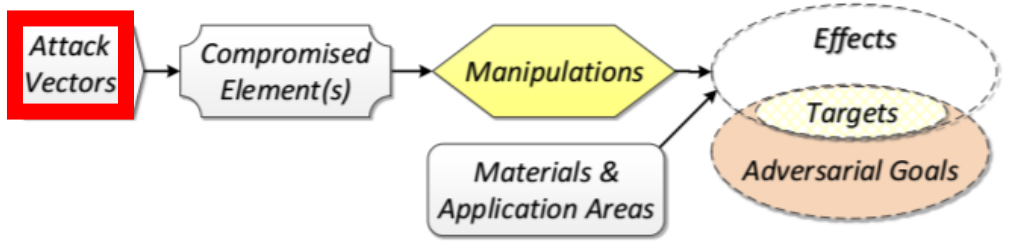
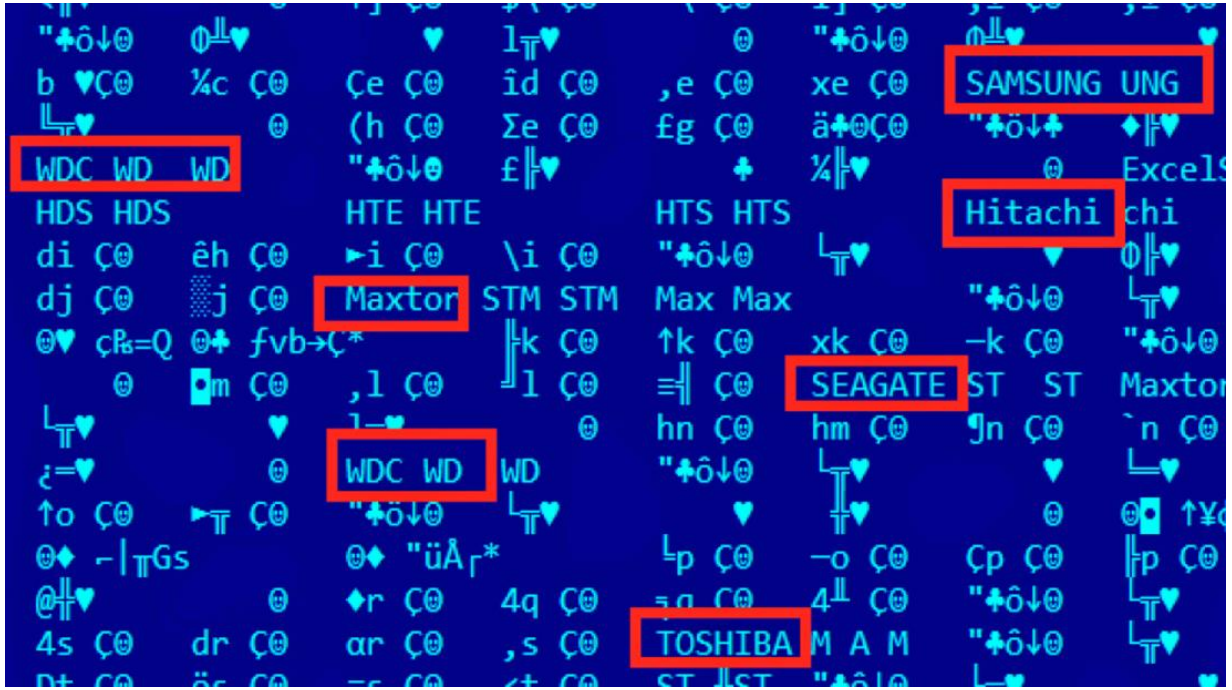
Attack Vectors



- Software Attacks:
  - General infiltration methods
  - Code injection into AM files
  - Software supply chain
- Hardware/firmware
  - Hardware trojans
  - Firmware updates
- Network
  - General network attacks
  - Protocol vulnerabilities

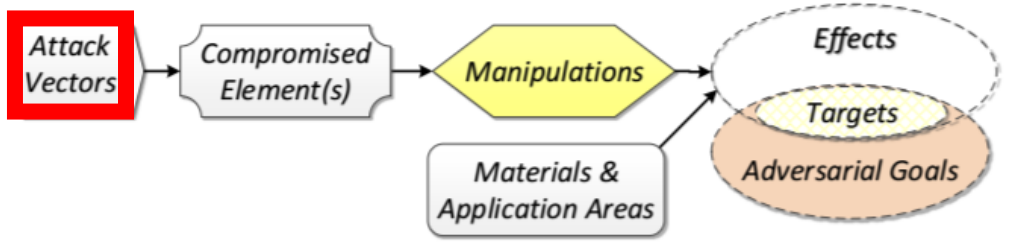


[7]

Bonus question: what is this?

And so much more…

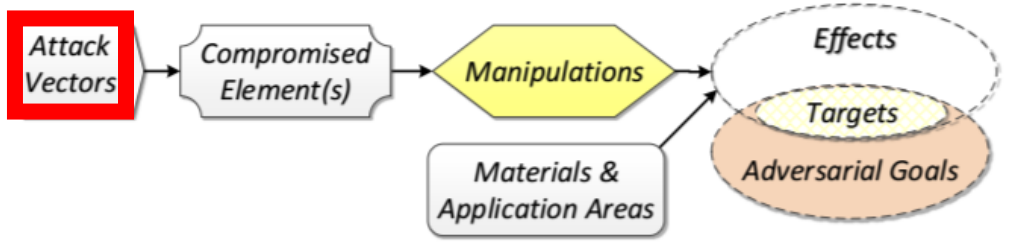
ACAD/Medre.A



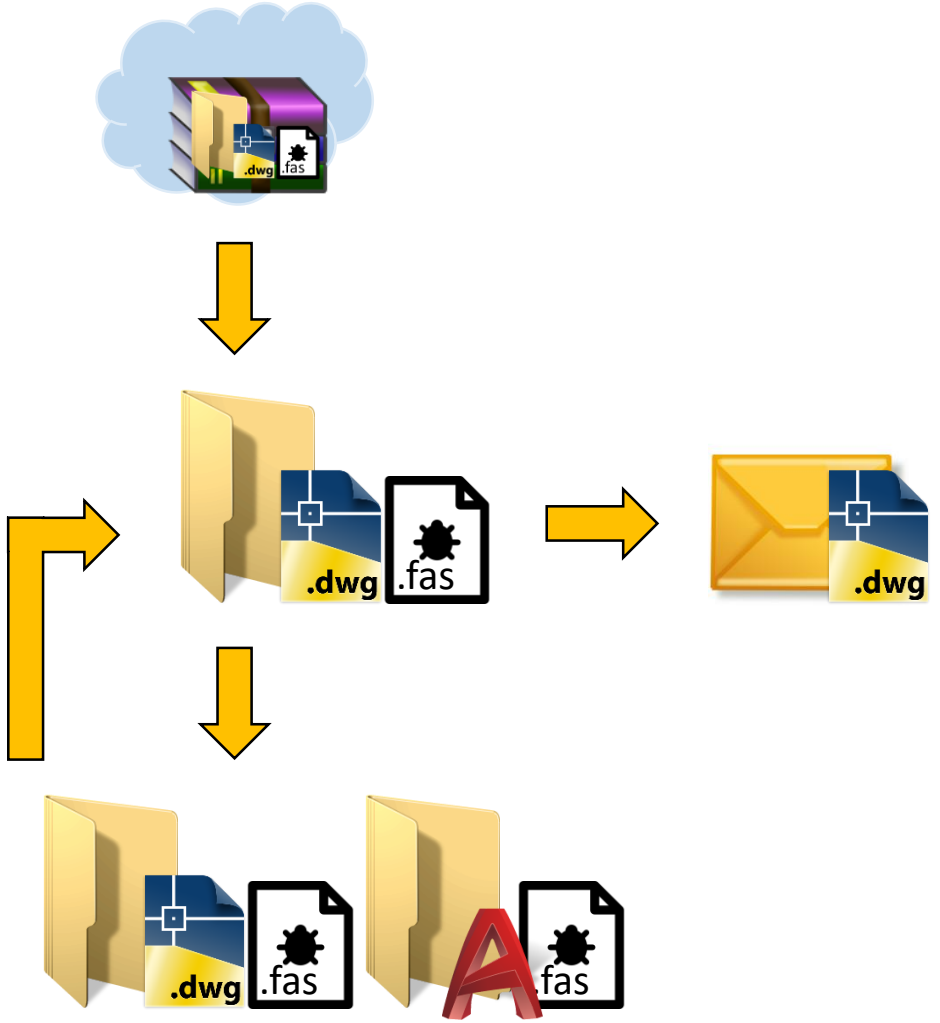
- Discovered by eset.
- Steals AutoCAD drawings.
- Written in AutoLISP.
- Over 100,000 designs leaked!

[3]
[4]
[9]

ACAD/Medre.A



1. User extracts files into directory
2. User opens the .dwg, .fas runs.
3. .fas copies itself to AutoCad directory and **current project directory** (why??).
4. .fas sends the model via email.
5. Further distribution.

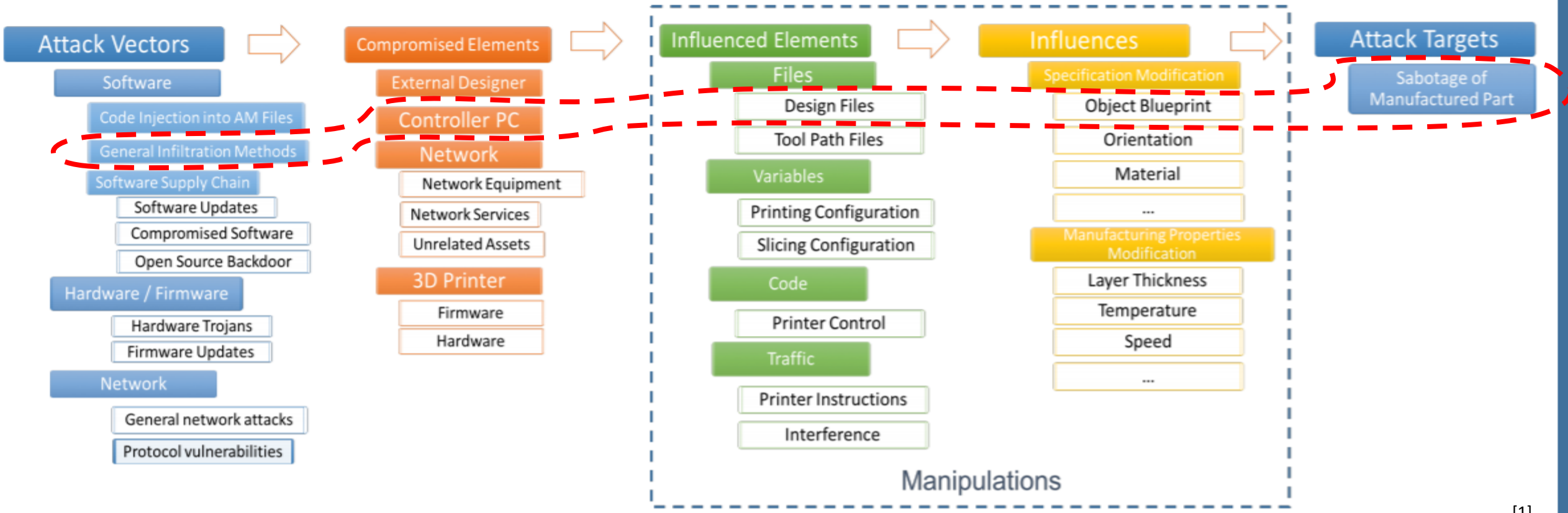


An Example – dr0wned

[5]

[6]

Attack Flow



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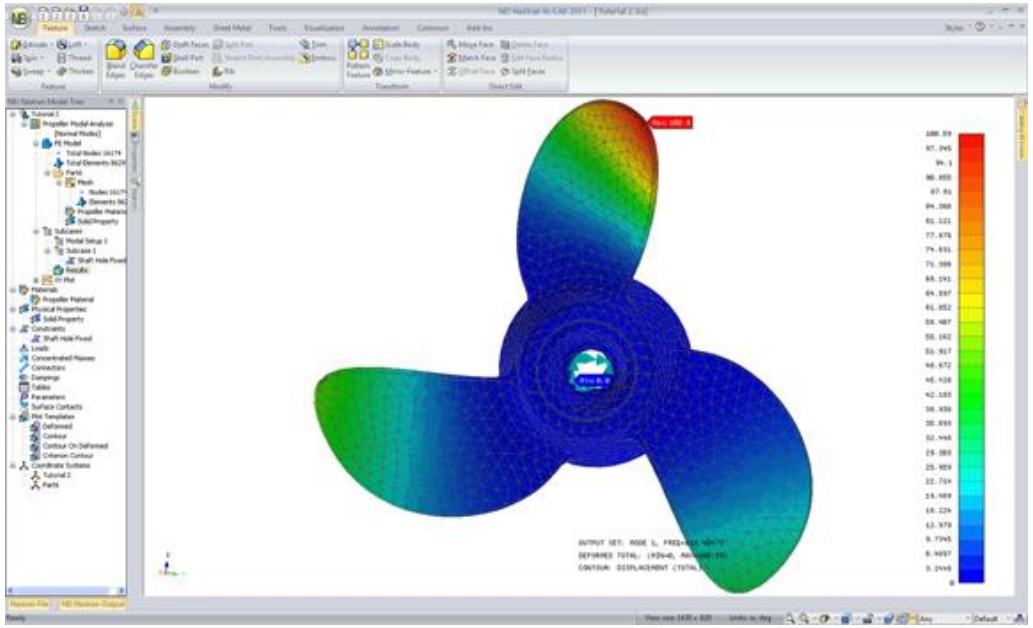
Solution?

- Methods of integrating a signature within the printed object.
- Software security of the entire 3D printing flow.
- Physical tests of the printed object.

- More research!



FEA - Finite Element Method [10]

Questions?

Bibliography

1. “dr0wned – Cyber-Physical Attack with Additive Manufacturing”. Sofia Belikovetsky, Mark Yampolskiy, Jinghui Toh, Yuval Elovici
2. http://img.etimg.com/thumb/msid-55952298,width-310,resizemode-4,imglength-102138/.jpg
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