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CAASE18
The Conference on Advancing Analysis & Simulation in Engineering
June 5 - 7, Cleveland, Ohio
Co-Hosted by NAFEMS DE Digital Engineering

A Journey Towards Commoditization of Simulation & Analysis IT Resources to Support Democratization

Ashish Jaiswal
John Deere

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Agenda

- Introduction:
  - How far have we come
  - Where we are heading
- Changing fidelity of the models
- Efforts towards democratization
- Need for re-look at the license model
- Key take away

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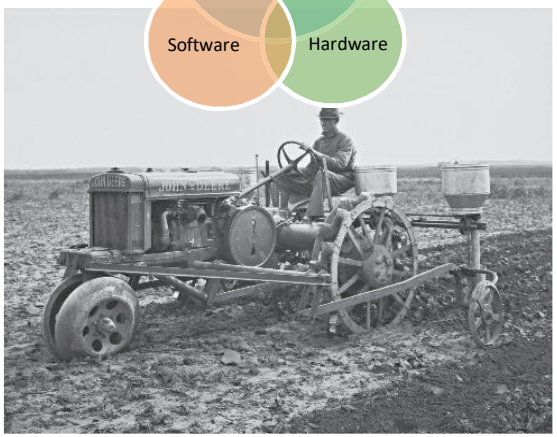
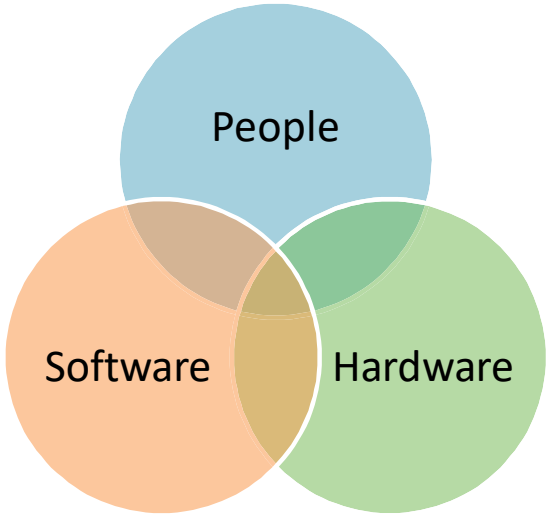
How far have we come





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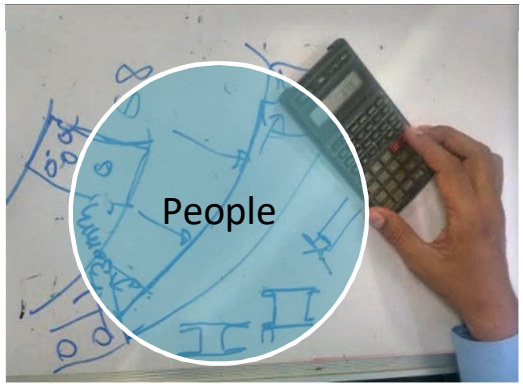
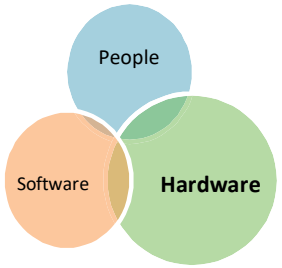
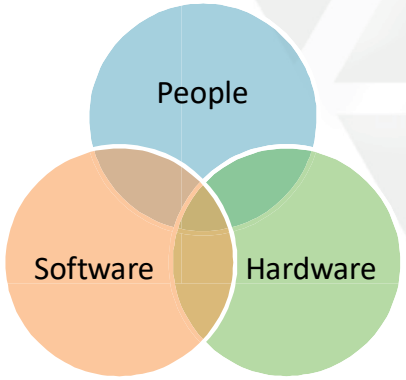
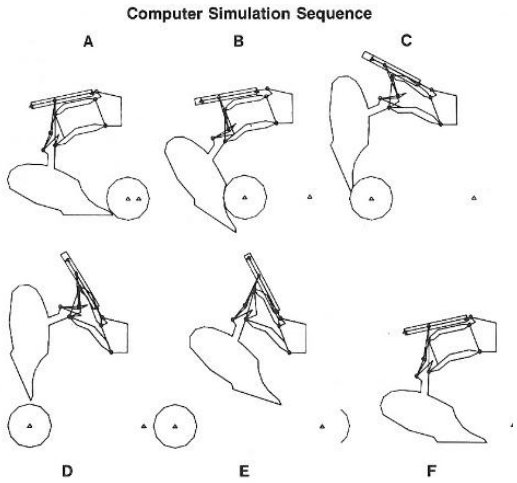
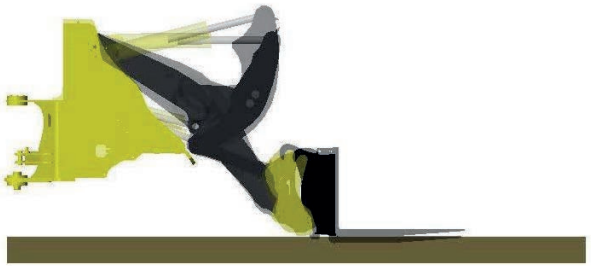








Sequence of computer-generated pictures shows simulated behavior of the plow as it unhooks from an embedded rock.



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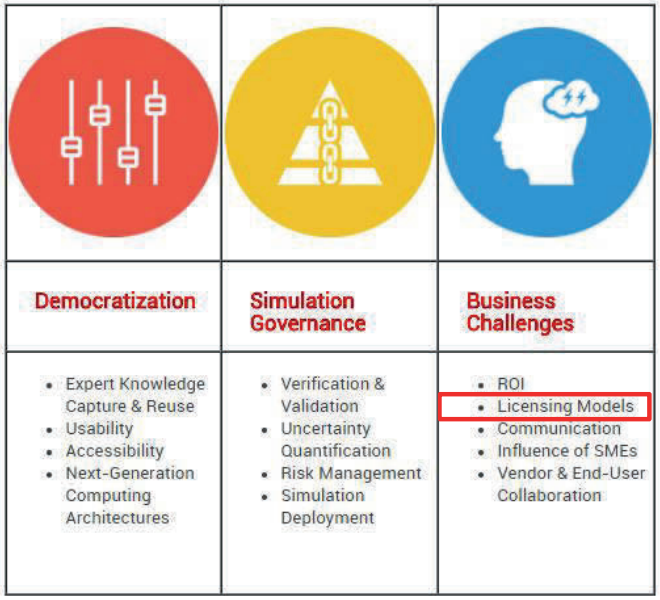
CAE industry initiatives

NAFEMS Simulation 20/20



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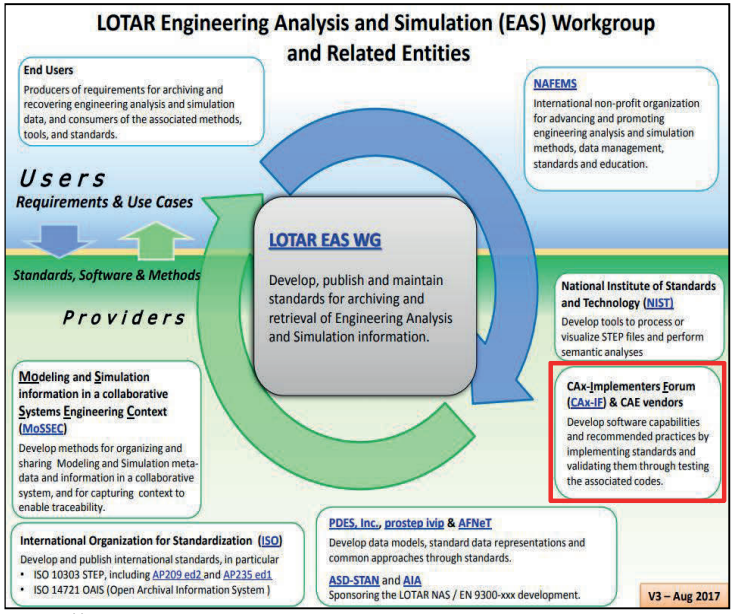

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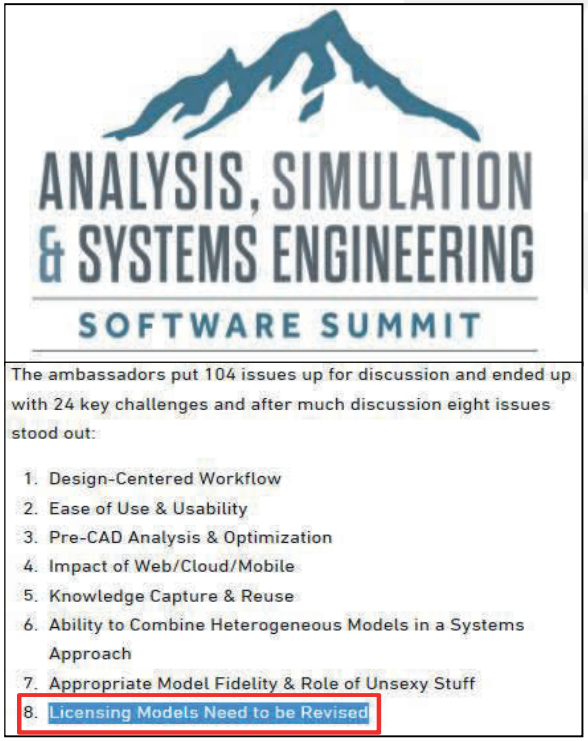

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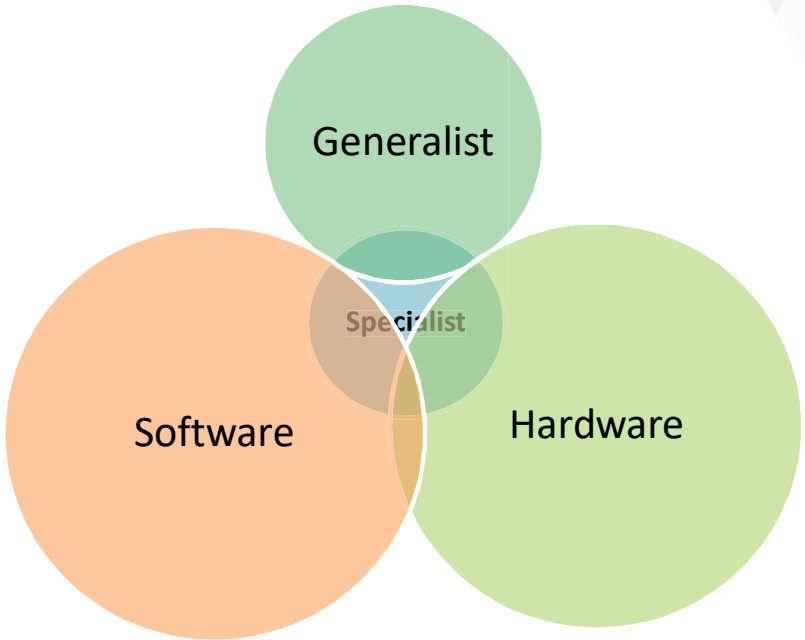
Where we are heading

- **Simulation Led Development**
- **High Fidelity Models**
- **Multi-Physics Simulation**
- Knowledge Capture
- Workflow Standardization
- **Process Automation**



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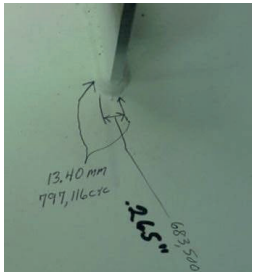
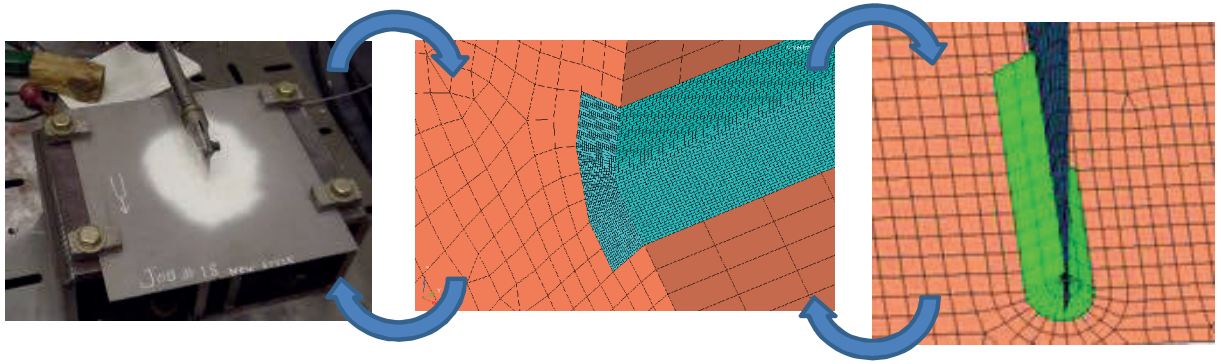
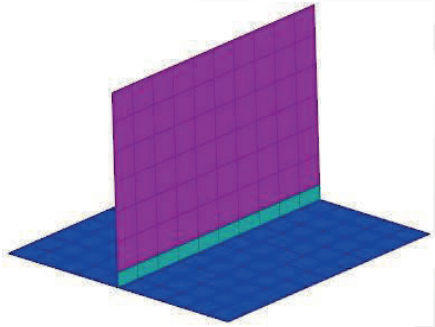
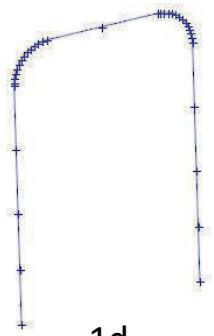
What is right fidelity

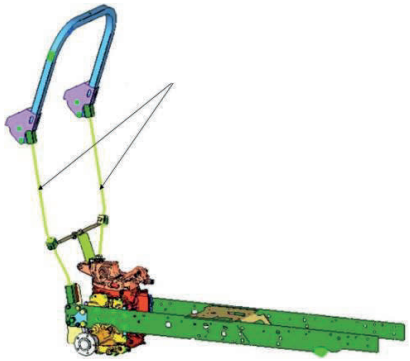




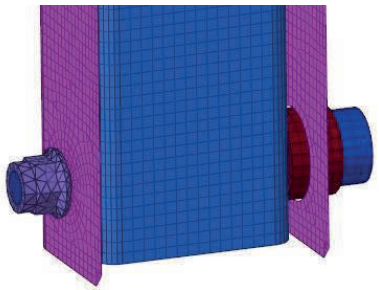




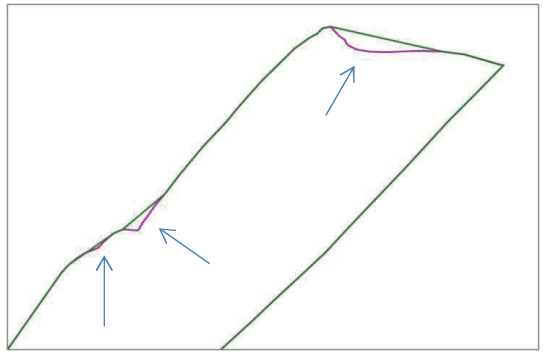
1d



1d+2d+3d



Hardware Detail



What detects the fidelity of the simulation model- Analysis insights, Solution Time…??

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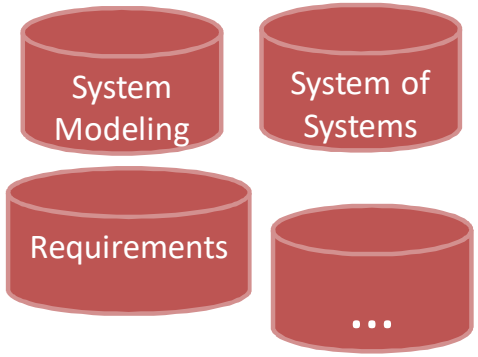
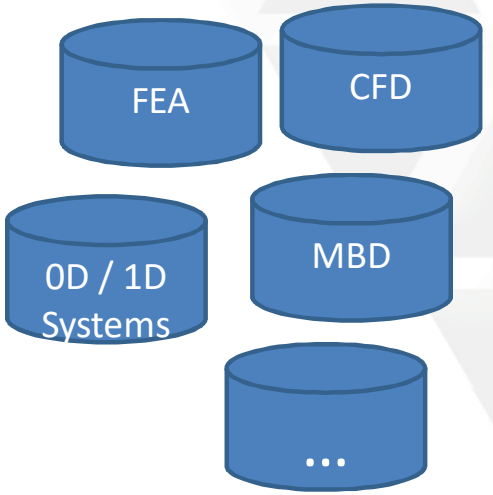
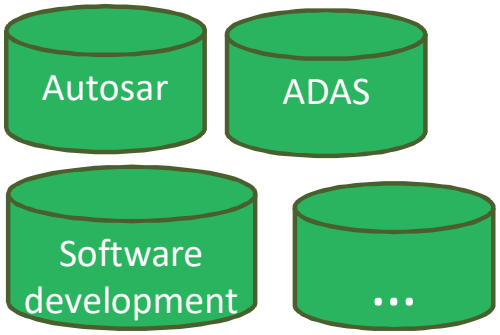
Model fidelity & workflows will drive simulations

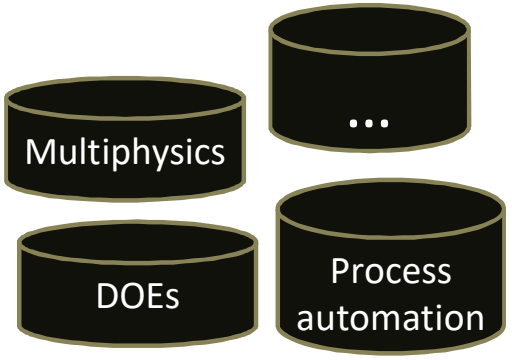


- More compute
- New CAE technologies
- New applications



- Examples
  - FEA + CFD
  - FEA + 1D Systems + MBD + …
  - 1D Systems + Requirements
  - 1D Systems + System of System + ADAS + Software +…





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Efforts towards Democratization

- Abstract modelling
  - CAD for Analysis
  - Analysis in CAD
- Analysis tools for designers
- Modular modelling approach
- Simulation Process Data Management (SPDM)
- Development of standard libraries

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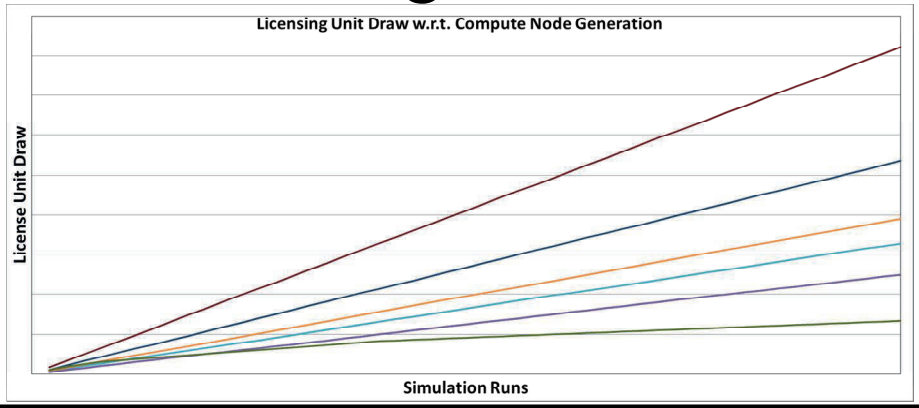
Licensing models needs to be re-looked

- Node locked does not fit today (under utilized assets)
- Feature based models very complex
- Difficult to exploit HPC advancements
- License costs ~10x higher than hardware cost



There are active efforts from few of the ISVs to address this industry's need

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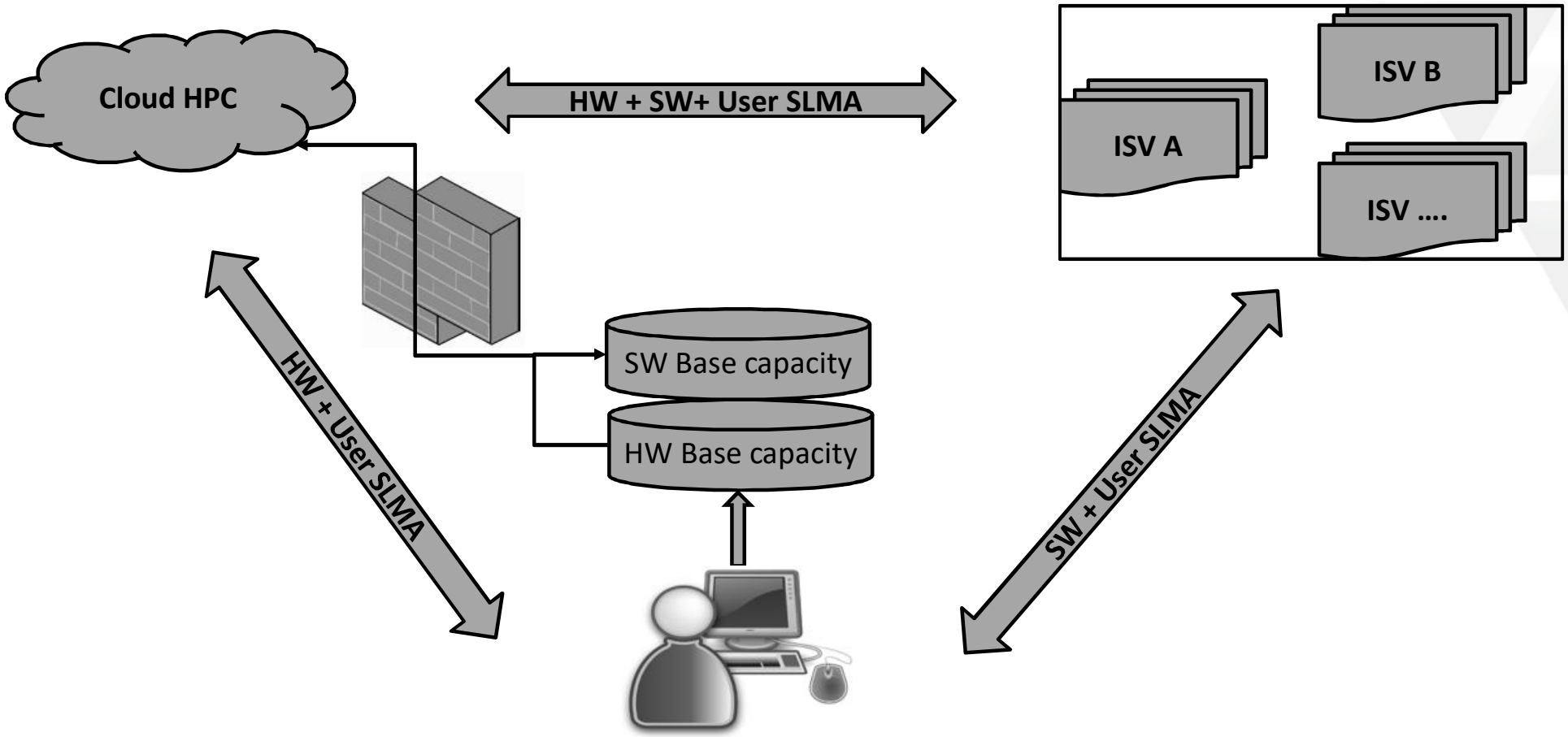
Hardware and Software Dynamic Access – A Thought



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Commoditization of Hardware - Realized

- HPC has been democratized
- On-premise HPC data centers
- Private data centers
- HPC in Cloud
- Hybrid-Model
- Off-the-shelf HPC appliance

Various computing options are available for businesses to choose from

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Commoditization of Software – Need efforts

- Software needs
  - Vast family of products platforms
  - A software does not caters the need of all
  - Data exchange constraints between the codes
- Current licensing structure - an obstacle
  - Single license shall provide access to all the modules/tool boxes
  - Need volume for flexible licensing
- Suggestions for new licensing structure
  - Type of physics to decide Units draw- Low/Regular physics to Niche physics
  - Re-categorize physics scale with the induction of new analysis capabilities
  - Build enterprise level unit draw discounting structure to promote concurrent jobs than traditional sequential jobs

For enabling the simulation revolution, hardware and software needs to be commoditize

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Commoditization of Software: On going efforts

	Positives	Challenges
Open Source Software	Freedom Unlimited New development	CAE/IT Expert Maintenance Sustainability
Collaboration with universities	Freedom Unlimited New development	Commercialization Usability CAE/IT Expert
Collaboration with vendors	Win-win model Strategic partnership Early users Prioritize development	Cost Lacks Exclusivity

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Key take away

- Need to thrive an ecosystem to support open standard for interoperability the models
- Need to enable software licenses to support HPC advancements
- Need to work out licensing scheme that incentivize growing simulation usage

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  - https://www.nafems.org/about/regional/americas/events/2020vision
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