Platforms for Electric Grids: Grid Architecture View

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25-27 July 2017

PNNL-SA-128083

PowerForward
Ohio Public Utilities Commission

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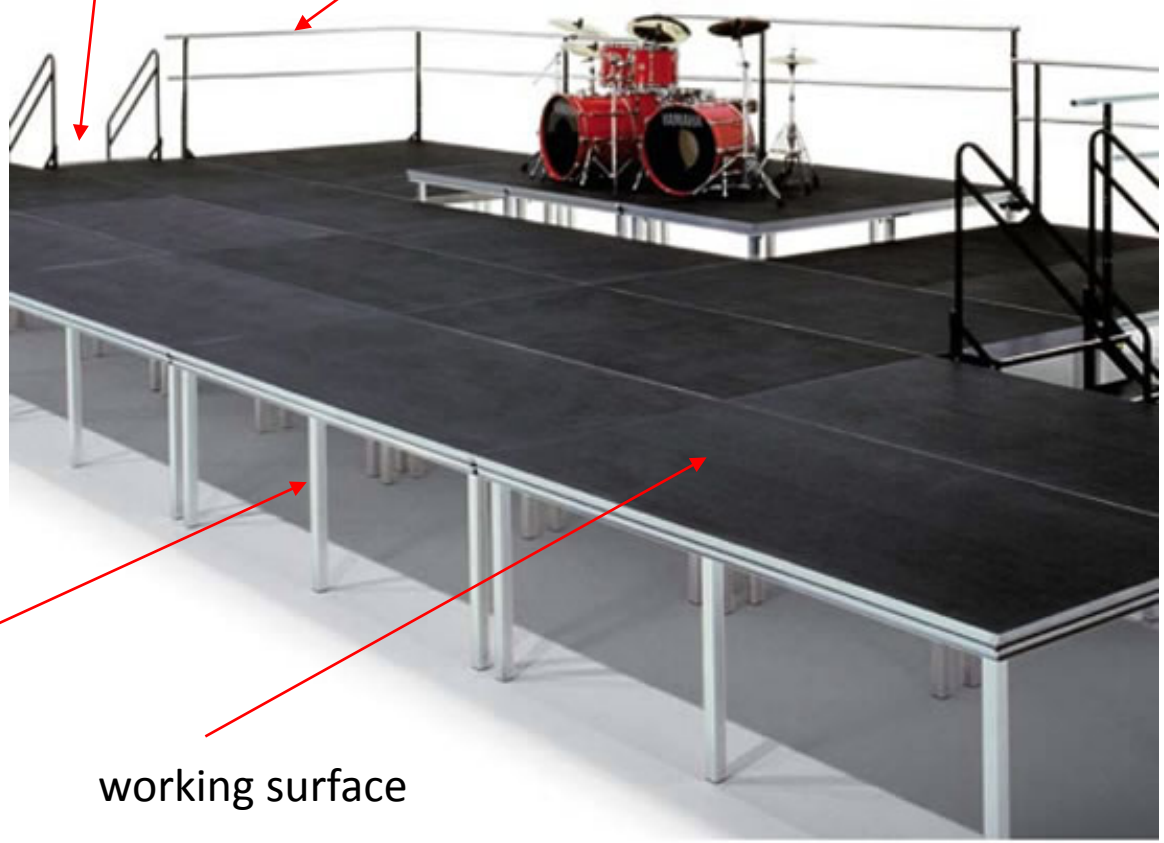
Topics

- Some Platform Definitions and Examples
- Platform is an Architectural Concept
- Platforms and the Grid
- Final Comments: What is core to the grid?

Some Platform Definitions

- a raised level surface on which people or things can stand (construction)
- set of components shared by several vehicle models (automotive)
- an underlying computing system on which applications may be run (computing)
- an integrated set of tools for creating and posting digital content (publishing)
- a set of components or services that creates a common foundation for some set of activities

A Platform Can Have Many Elements



Source: Black Cat Music

A Platform Serves Many Purposes

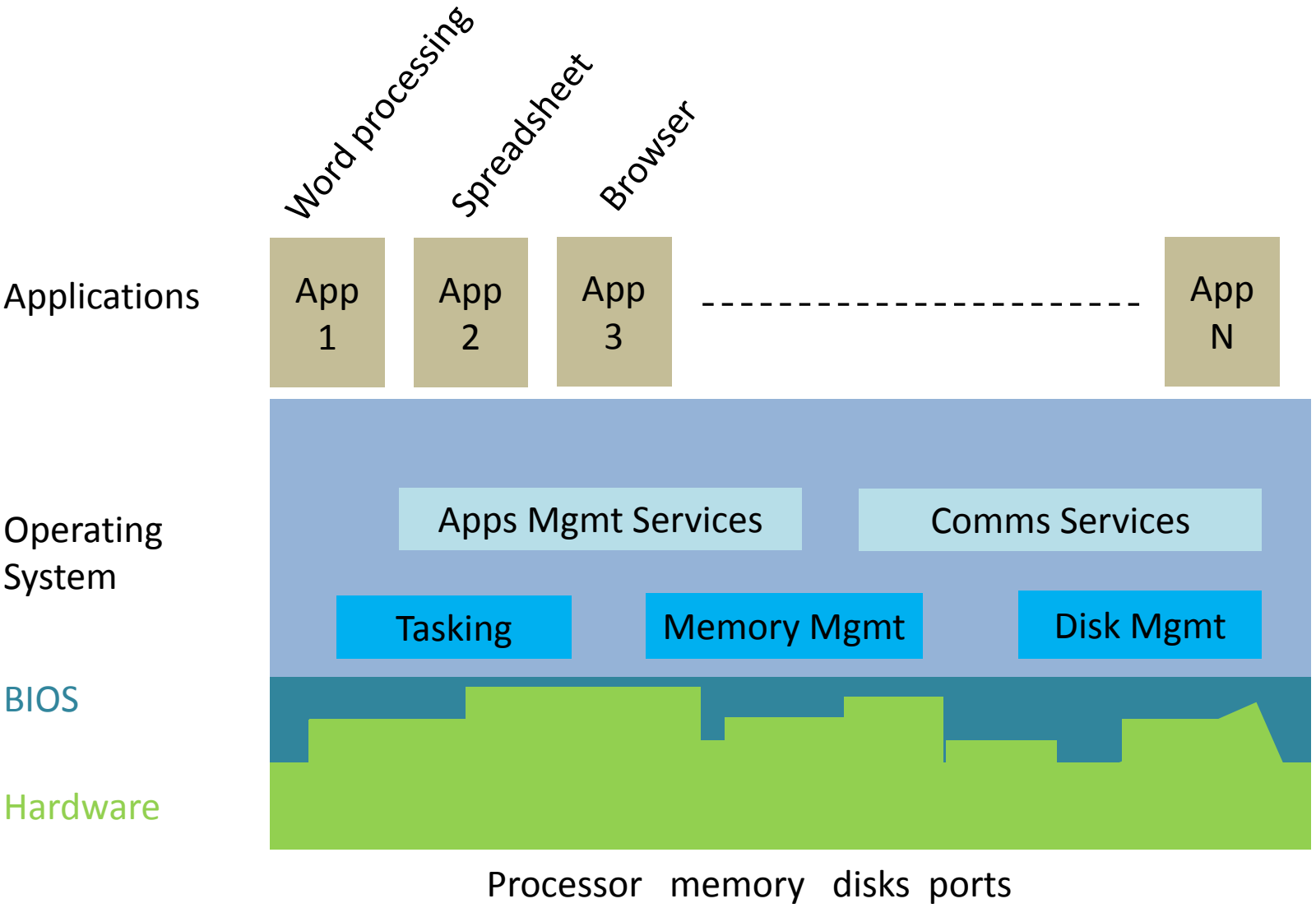
Source: Stage Tek

A Platform Can Have Layers

We will see these same ideas in computing system and the Grid

Source: Fibrosa Pavilion NSW

Example: Computing



Platform is an Architectural Concept

- This is about structure: how system elements grouped, organized, and related to each other
- Distinguish common support capabilities ("foundation" or "core") from uses or applications

A platform is a stable collection of components that provide fundamental or commonly-needed capabilities and services to a variable set of uses or applications through well-defined interoperable interfaces.

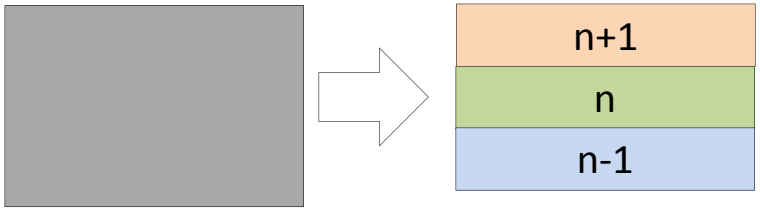
Some Key Properties of a Platform

- Separates foundation functions from end uses (“applications”) via layering
- Provides a set of services and capabilities that are useful to many applications
- The platform is stable over time, while the applications may change frequently
- Provides isolation of changes between applications and underlying infrastructure
- May scale (adjust resources) to support variable demands from applications
- Open: third parties can freely create applications that use the platform (needs open standard interfaces)

The value of a platform is spread across many uses.

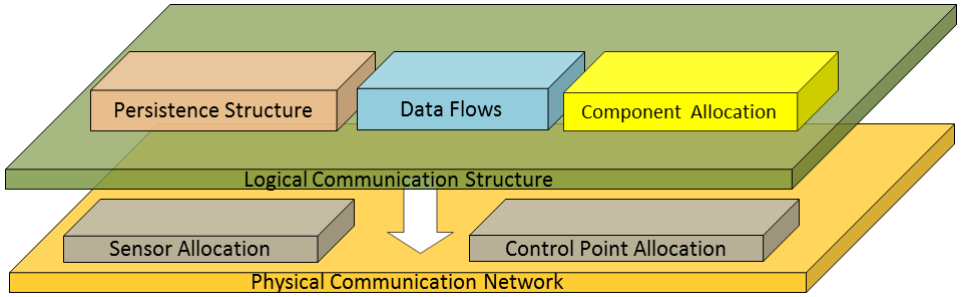
Layering is Powerful Architectural Concept

- Partition structure into stacked layers
  - May be two or more layers in a platform



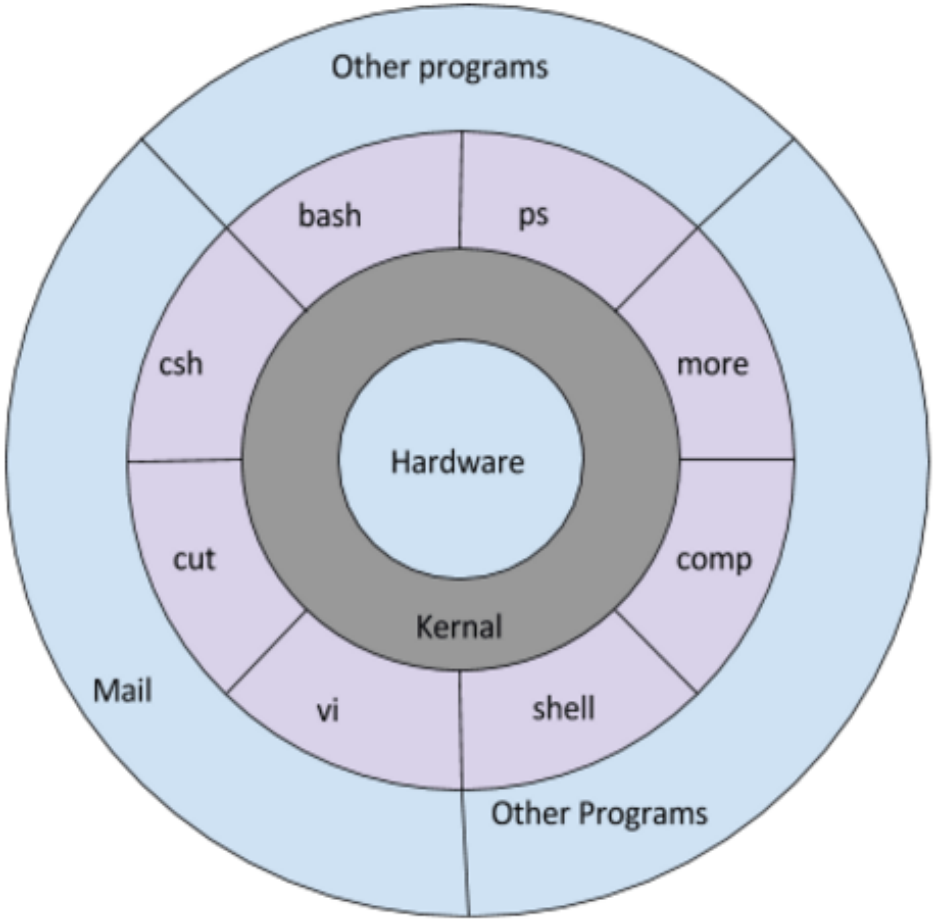
General layer decomposition

- Layer n isolates layer n-1 from layer n+1
- Logical/physical layer separation
  - Classic example: communication logical/physical layer decomposition

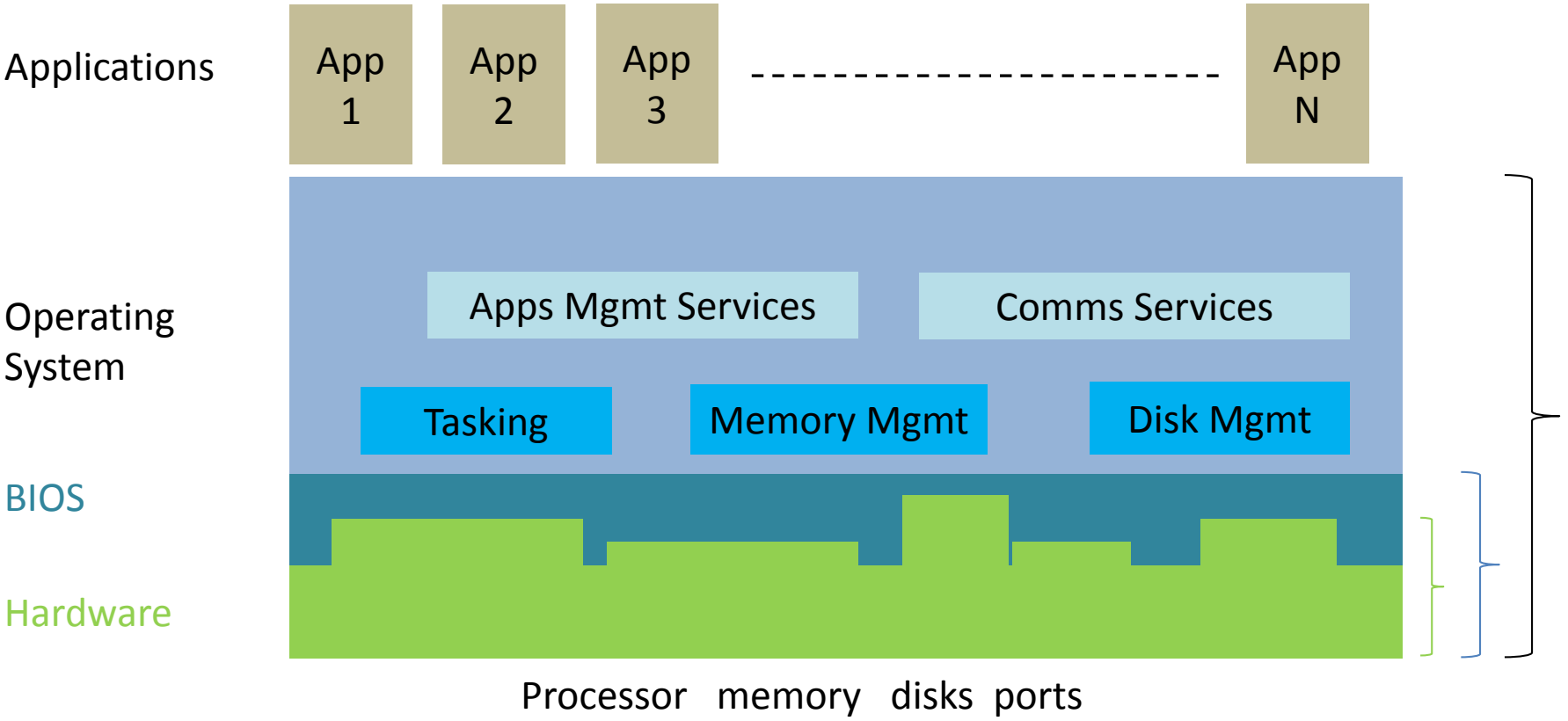


Communication logical/physical decomposition

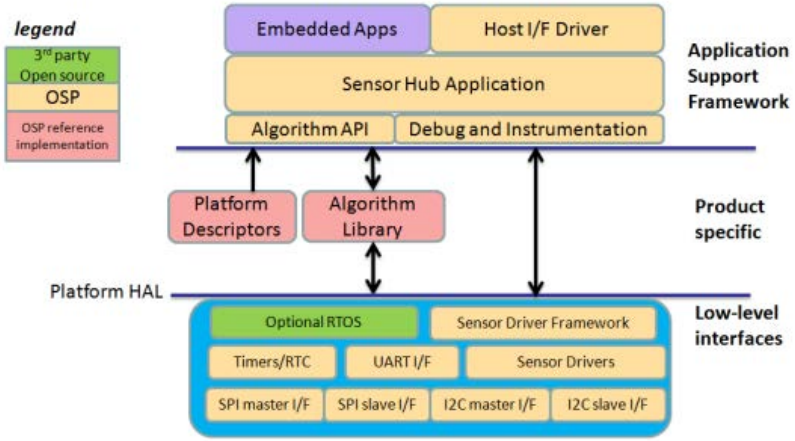
Platforms are Sometimes Drawn as Onions



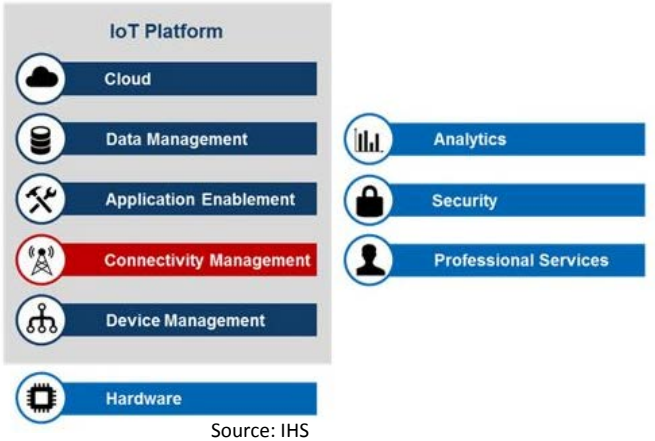
“Platform” Depends to Some Extent on Point of View and is Recursive



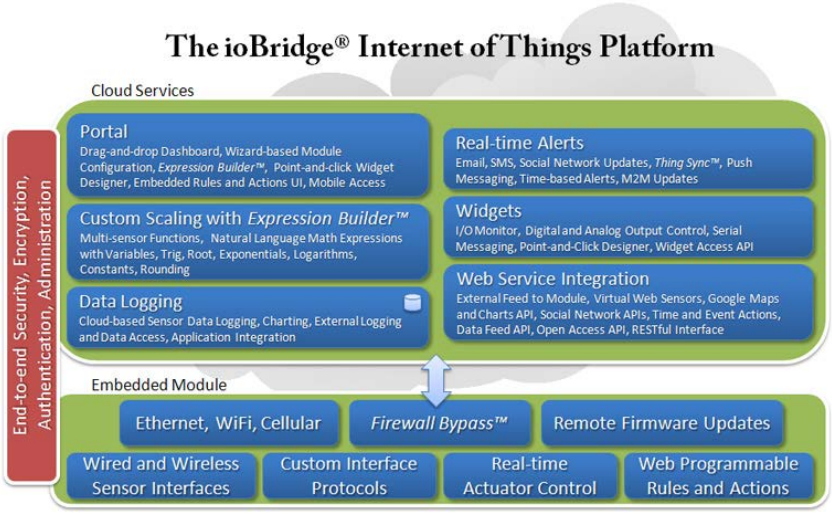
What's in A Platform?



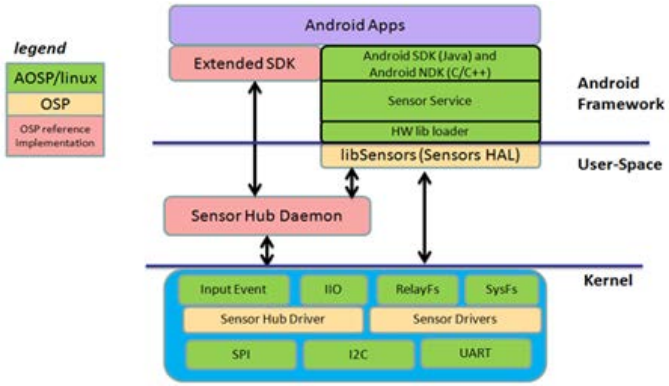
Source: itersnews



Source: IHS



Source: ioBridge



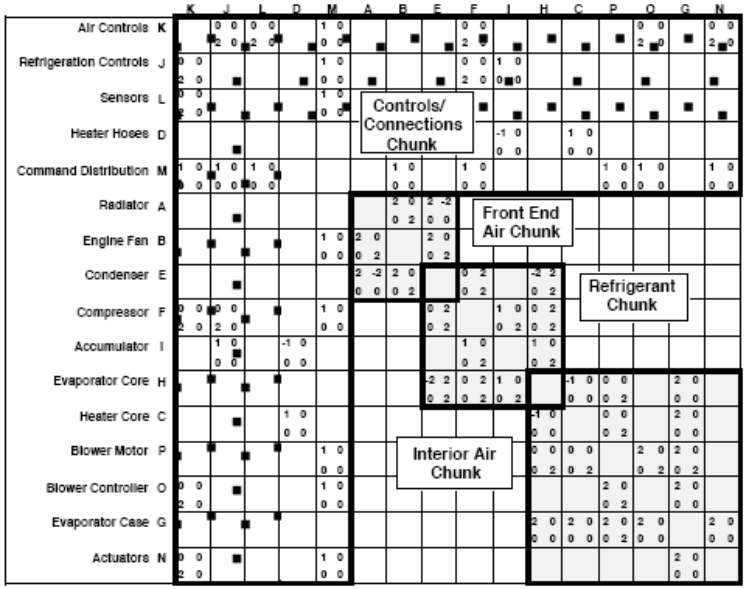
Source: EE Journal

What Belongs in the Platform?

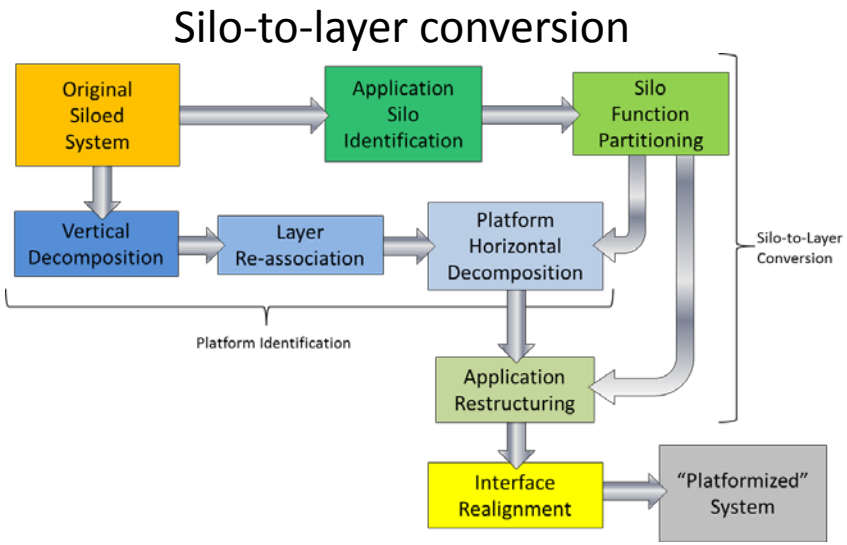
- Determined by function: foundational support vs. specific “end” use
- Many methods are available to determine what belongs in a platform

Ad hoc analysis

Design System Matrix



Silo-to-layer conversion

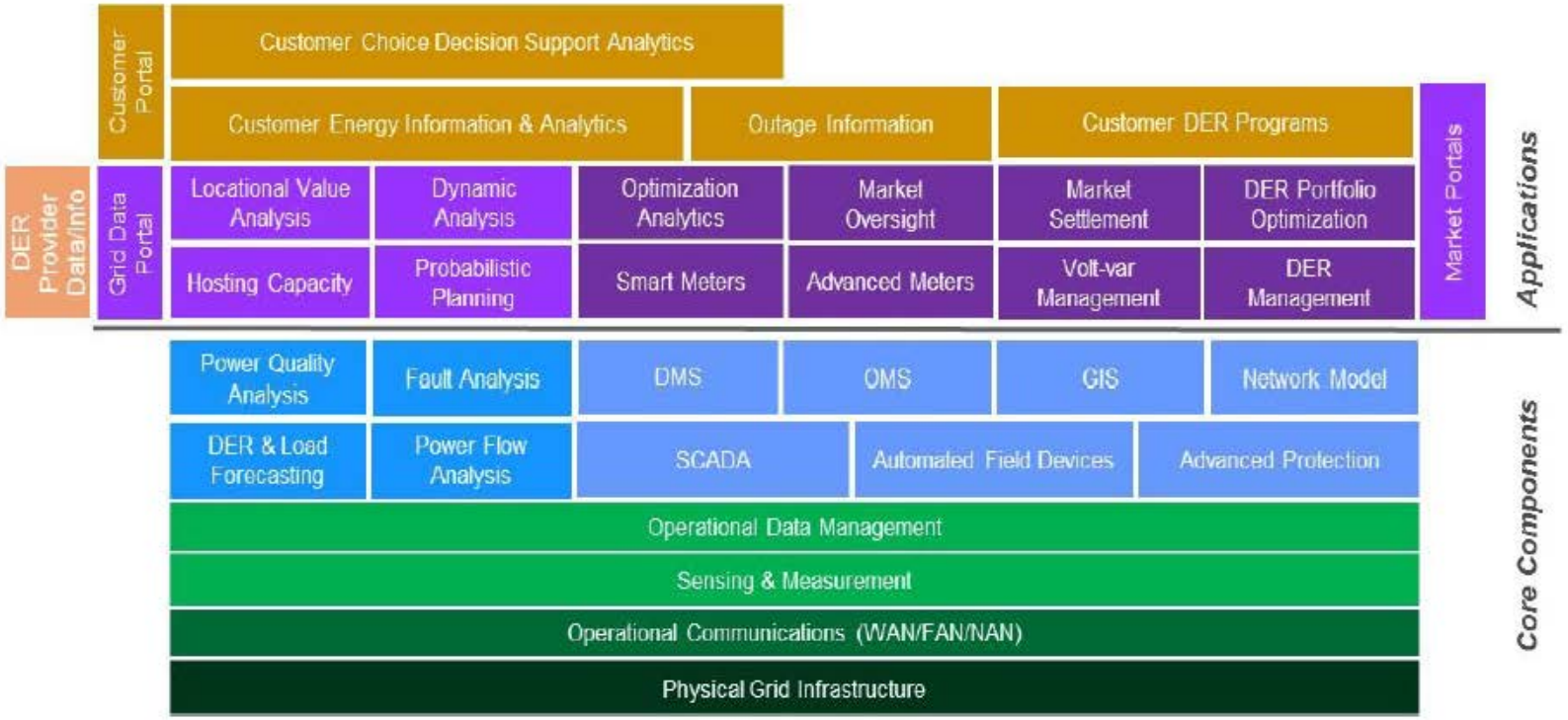


Platforms and the Grid

- Many types of platforms are becoming available for a variety of purposes
  - Sensor management
  - Data acquisition
  - Analytics
  - IoT
  - Grid Management (ADMS)
- Various implementations: middleware, Cloud, PaaS, etc.

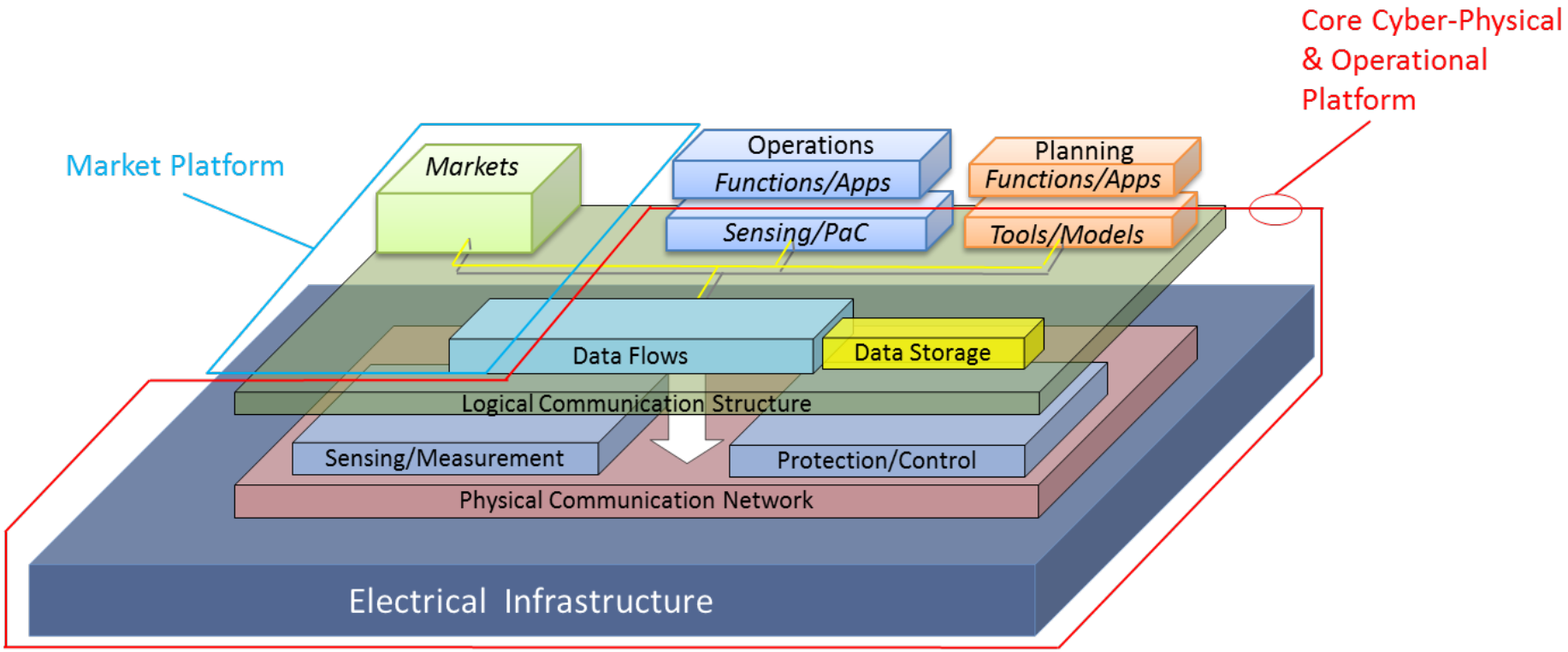
DSPx Project
Distribution System Platform

- Definition of Distribution System Platforms for High DER grids
- https://doe-dspx.org/



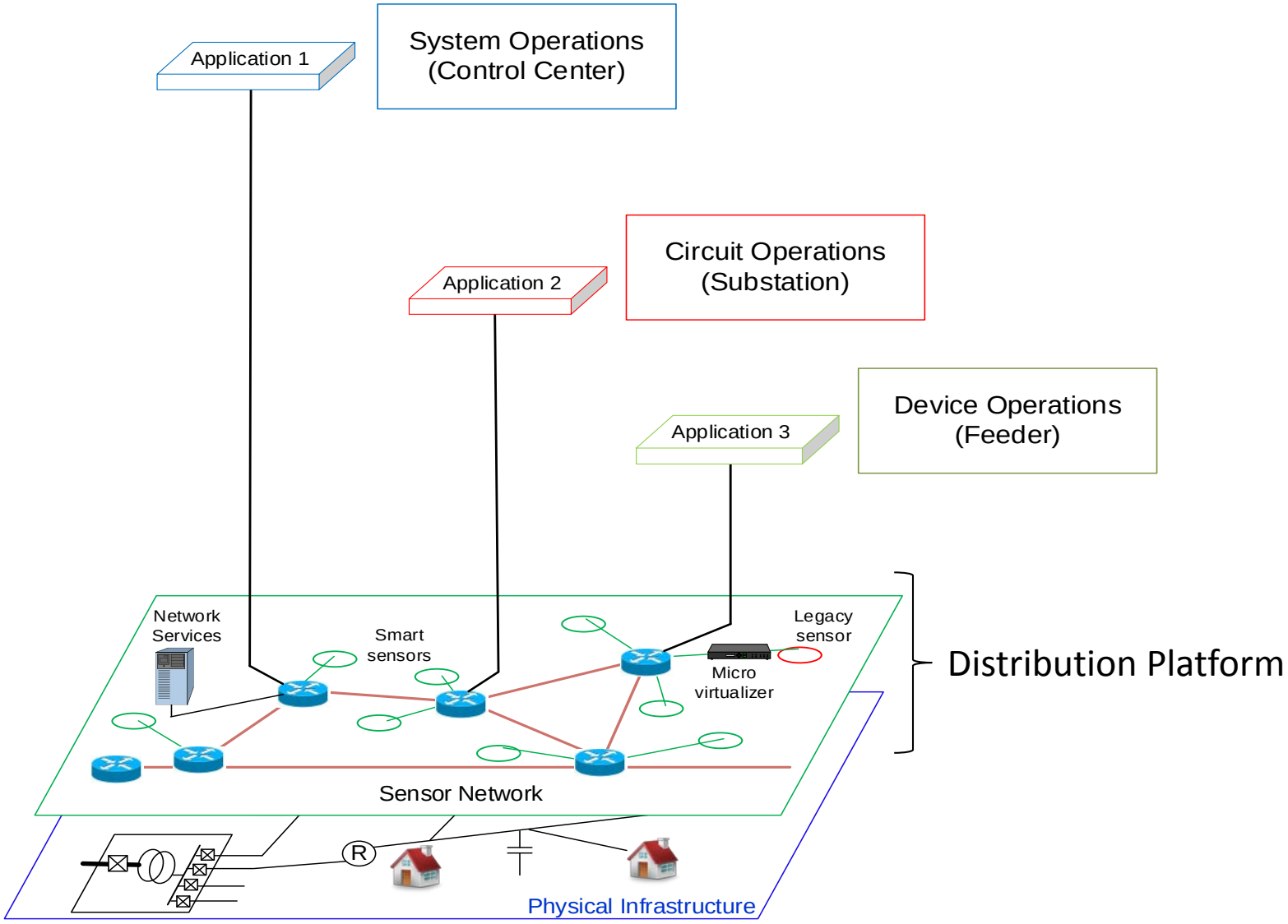
Source: Modern Distribution Grid Volume 3 (DSPx Project)

Distribution Grid as Platform



Adapted from: Modern Distribution Grid Volume 3 (DSPx Project)

Distribution Platform Concept



Final Comments

- Platform is a useful architectural concept
- Many types of platforms are possible and available
- Separate “core” components from system uses (“applications’)
- Provides future-proofing of investments and can avoid lock-in
- Distribution grid can be viewed as a platform

- Key question: what grid components are fundamental and should therefore be viewed as core infrastructure?

Thank You

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