On the Operationalization of Composable Architecture by Means of Normalized Systems Theory

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Presentation Content

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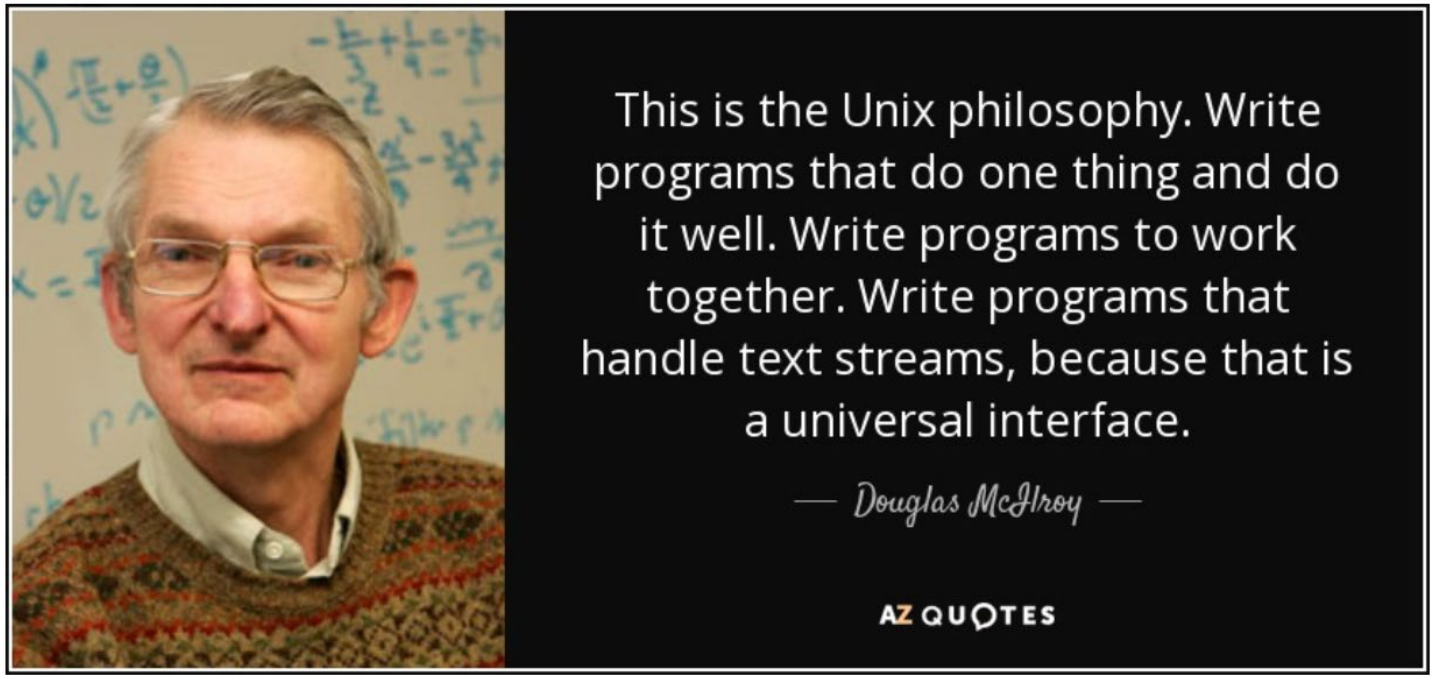
Introduction

The Dream of McIllroy,1968 NATO conference on Software Engineering:

"... I expect families of routines to be constructed on rational principles so that families fit together as building blocks. In short, [the user] should be able to safely regard components as black boxes. "



Gartner’s Composable Architecture Framework

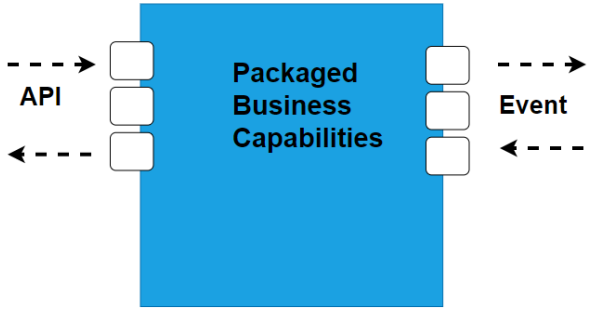
Business Capabilities

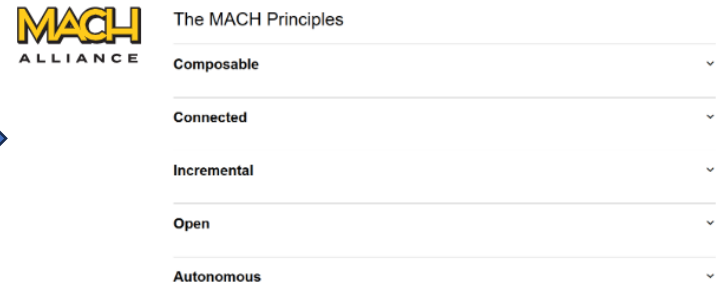
Packaged Business Capabilities

Strategic Alignment	Governance	Methods / Information Technology		People	Culture
Strategic BPM Alignment	Contextual BPM Governance	Process Context Management	Multi-purpose Process Design	BPM and Process Literacy	Process Centricity
Strategic Process Alignment	Contextual Process Governance	Process Compliance Management	Advanced Process Automation	Data Literacy	Evidence Centricity
Process Positioning	Process Architecture Governance	Process Architecture Management	Adaptive Process Execution	Innovation Literacy	Change Centricity
Process Customer and Stakeholder Alignment	Process Data Governance	Process Data Analytics	Agile Process Improvement	Customer Literacy	Customer Centricity
Process Portfolio Management	Roles and Responsibilities	BPM Platform Integration	Transformational Process Improvement	Digital Literacy	Employee Centricity

Factors

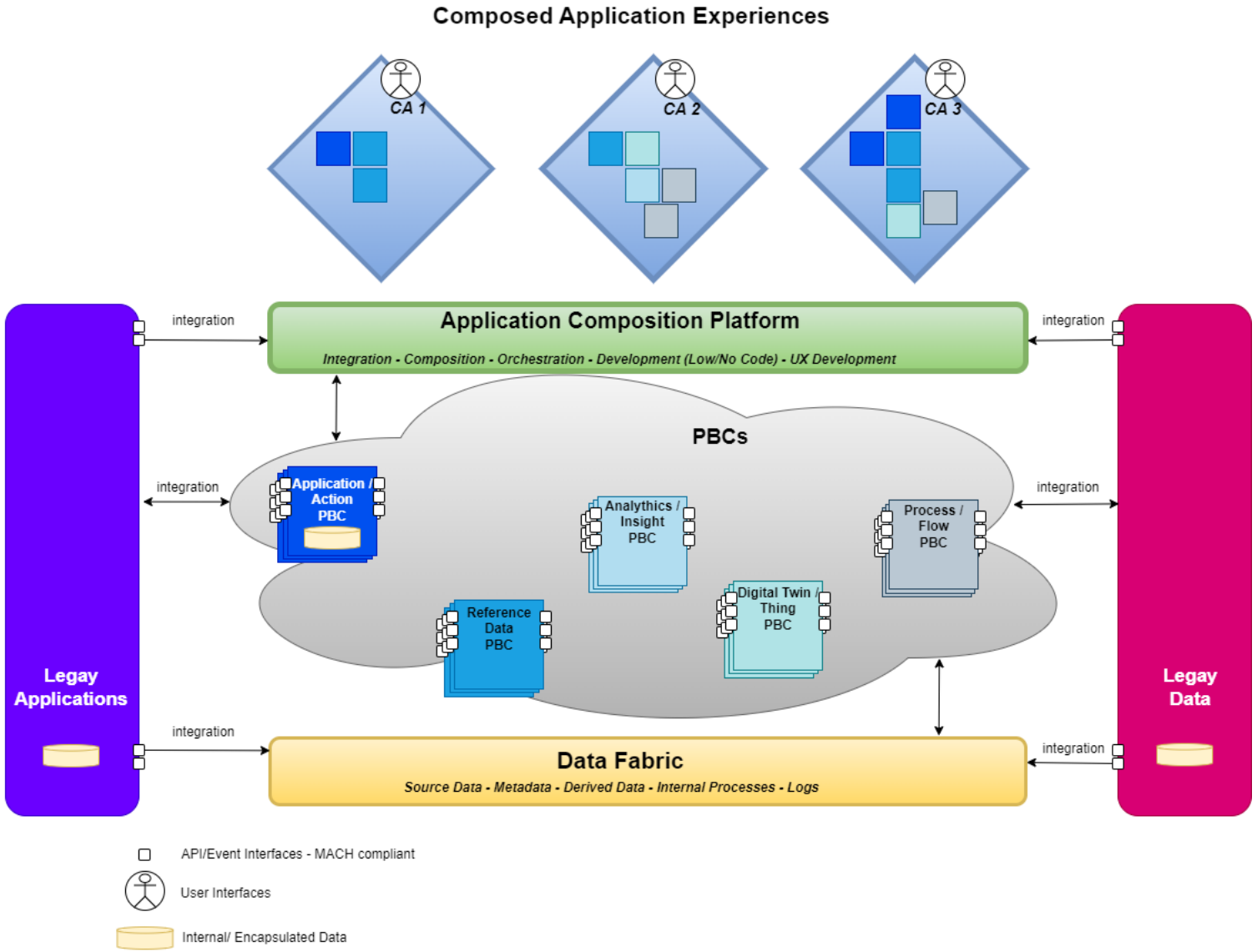
Capability Areas





- Modular and cohesive
- Autonomous
- Orchestrated
- Discoverable

Gartner’s Composable Architecture Framework



Application Composition Platform

- (Re)-Combine PBC in CAE
- Make PBC discoverable
- Manage PBC Life Cycle

Gartner's Composable Architecture Framework

Criteria	Traditional Applications	PBCs
Primary value	Business capability	Business capability
Primary access	User Interface (UI)	Programmatic Interface (API, event)
Scope	Many business objects	One business object
Internal architecture	monolith or modular	monolith or modular
Designed for	Business	Business and IT
Design priority	Stability	Agility
Delivered value	Business solutions	Recomposable business solutions
Production style	Project	Product
Essential tools	Customization included	Composition, added cost
Required IT skills	Customization, low	Composition, high
Cost	Bulk, some "shelfware"	Componentized, tracks value
Governance	Sample	Complex
Internal data	"Owned"	"Owned"
Open for integration/composition	Partially, a secondary priority	Fully, primary design objective

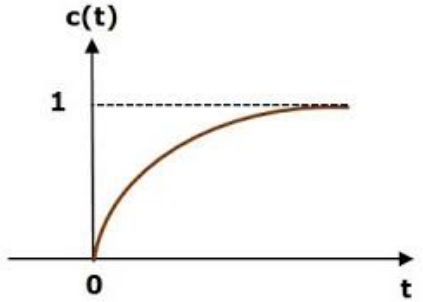
TABLE I

CONTRASTING TRADITIONAL WITH PBC APPLICATION LANDSCAPES (FROM [2])

Normalized Systems

System Stability & Statistical Entropy

Bounded Input → Bounded Output



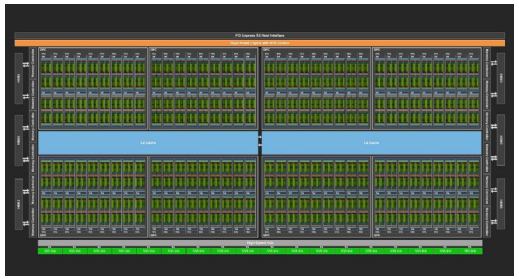
Bounded functional change → bounded amount of work and independent of size of the system
If there is a dependency on the size of the system → **Combinatorial Effect (CE)**

An Evolvable Software System is a System that is free of CE

Necessary conditions for Evolvable Software Systems:

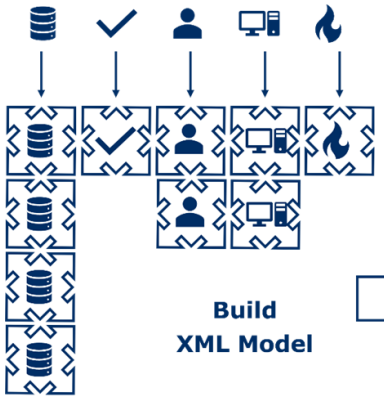
- **SoC**: Separation of Concern
- **AvT**: Action version Transparency
- **DvT**: Data version Transparency
- **SoS**: Separation of State

Fine Grained Modular Structures



Normalized Systems

Create Software Elements



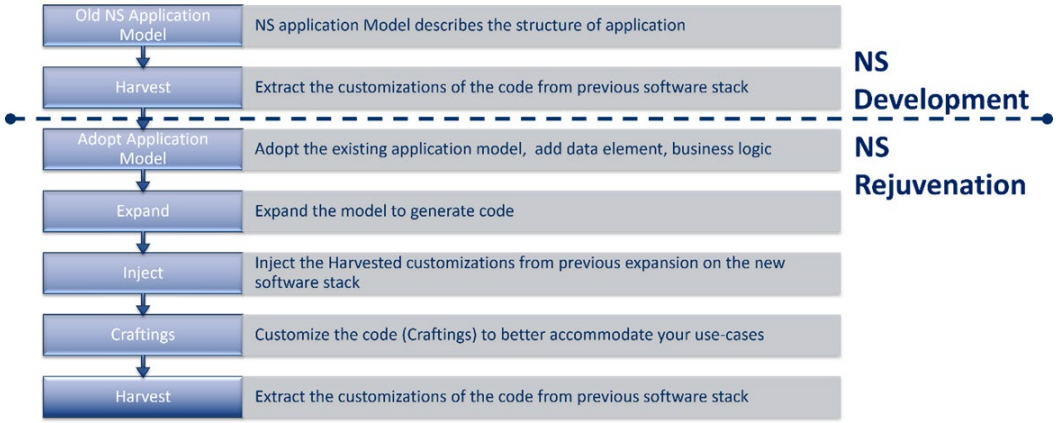
Build
XML Model

Expand Software Elements

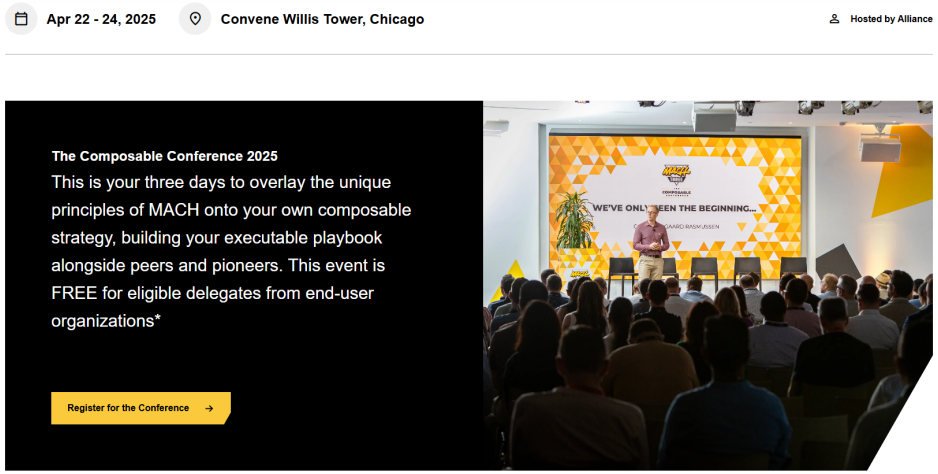
NS application =
n instances of elements

Data
Task
Flow
Connect
Trigger

Customize and Rejuvenate



Related Work



1000's of Blog Posts

A few Academic Papers

- A.W. Scheer: "The Composable Enterprise"
- I. Ivas: "Implementation of Composable Enterprise in an Evolutionary Way though Holistic Business-IT Delivery of Business Initiatives

Author: Mark Demeny, Technology Analyst - MACH Alliance

Composable comes of age in the Gartner DXP Magic Quadrant

Gartner recently released their **2025 Gartner® Magic Quadrant™ for Digital Experience Platforms** (DXP MQ) report which highlighted several trends around composability that the MACH Alliance has advocated for years.

It is worth noting that four out of five vendors new to the report are MACH Alliance members - and this is not surprising given the overall trend towards composability.

These include:

- **Builder.io**
- **Contentful**
- **Contentstack**
- **Uniform**

While these vendors are not new, it is only recently that the DXP criteria has included composability as a key requirement. The report itself notes:

"By 2026, at least 70% of organizations will be mandated to acquire composable DXP technology, as opposed to monolithic DXP suites, compared to 50% in 2023."

And as a result, one of the new mandatory capabilities for inclusion is:

"A composable architecture for modular and API-first approaches, with a set (or sets) of discrete, task-oriented and independently deployable packaged business capabilities (PBCs)."

Operationalization of Gartner's Composable Architecture Framework

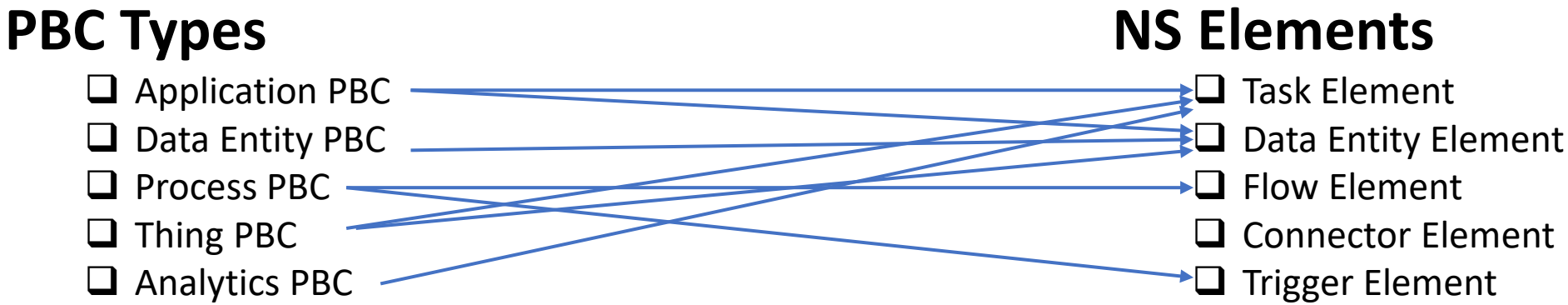
Defining Business Capabilities

- ❑ Limited standards
- ❑ Aligned with Business ?

PBCs and Modularity

- ❑ Level of granularity?
- ❑ According to NS, the correct granular level is the level that respect the 4 theorems
  - ❑ SoC → PBC that represent actual business activities
  - ❑ AvT → No mentioning of versioning or semantics, only tech standards
  - ❑ DvT → Not mentioned, pushed toward the Data Fabric, where it is not mentioned either
  - ❑ SoS → Orchestration/Choreography only possible with state keeping – confusion with stateless APIs possible

Operationalization of Gartner's Composable Architecture Framework



NS Elements have built-in proven evolvability

PBCs, as defined, have not as the guidance is missing

Operationalization of Gartner's Composable Architecture Framework

PBC Platform

- ❑ Discover
- ❑ (Re)compose → Customizations
- ❑ (Re)deploy → Harvest → Rejuvenate

Design level vs Instance Level vs multiple instance level?

Gartner suggest multiple instances (part of CA) of a PBC template to be updated and redeployed.

A mechanism of harvesting and rejuvenation must be there, or a CE is being introduced

Validation and Discussion

Feedback from the MEITA[1] students of the AMS[2] on the Composable Architecture framework, after being exposed to NS

- ❑ **Defining Business Capabilities:** hard to grasp the meaning of Business Capabilities.
- ❑ **Fine grained modularity**: a result of applying NS and expected for an evolvable system yet missing in the framework.
- ❑ **SoC only applied theorem**: SoC addressed but the other theorems not. The door is still open for CE.
- ❑ **Interesting technological concepts**: MACH Alliance and low/no-code platforms.
- ❑ **Focus on speed, not evolvability:** more emphasis on faster delivery/deployment then on evolvability (change over time).

Overall, the feedback indicates a need for more concrete guidance on operationalizing a PBC architecture, similar to what NS provides.

[1] Master in Enterprise IT Architecture
[2] Antwerp Management School

Conclusion

- There is interest on Composable Architecture in “gray literature”, but academic publications are lagging.
- NS theory about modularity is a suitable reference to evaluate the promised evolvability advantages of using Composable Architecture
- The combination of both the Composable Architecture Framework, with NS operationalization concerns, result in more guidance on how to make it happen.
- The theoretical comparison get support from a control/validation group.