Agile Tour Vilnius 2024

Designing Organizations with Robotics Subsumption Architecture

Sue Ryu
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# Explore the Power of **Subsumption Architecture**

Unleash <mark>Agility</mark> through <mark>Autonomy</mark>!

➢ Just as it **revolutionized** the robotics industry and I believe it can do the same for **Agile** by bringing true agility through creating an organizational eco-system that enables autonomy throughout the entire the organization.

By the end of this webinar, you will gain a understanding of

➢ What the Subsumption Architecture is.

➢ How Subsumption Architecture can **unleash Agility** &

➢ Inspire and Empower you to **initiate the transformation** at your organization.

My Journey with Scrum
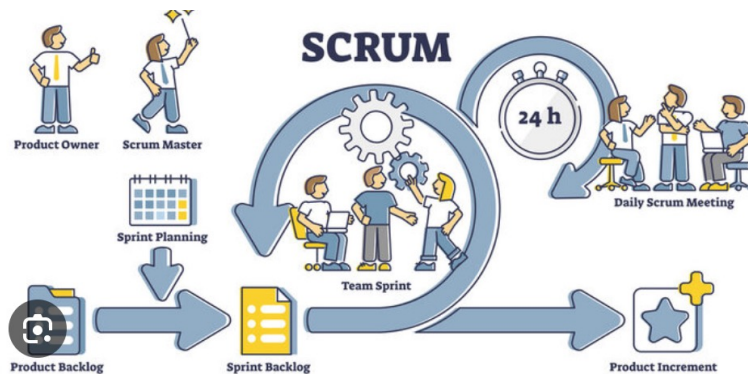
2008 – 16 years ago – Introduced to Scrum by **a co-creator of Scrum, Ken Schwaber.** He came to NYC to introduce Scrum. At the time, I was working as **a process methodologist** for an Energy Billing software co. to improve the quality of Software as well the quality of life.

Vested Interest in learning more about Scrum. Sold on Benefits.

Hit a **Roadblock for Scaling Scrum for large organization, like** ADP, Accenture – Feature Teams work but we needed more.

Now, SAFe – is a good framework but not an agile framework.

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In Search for
a Good Scrum Scaling framework
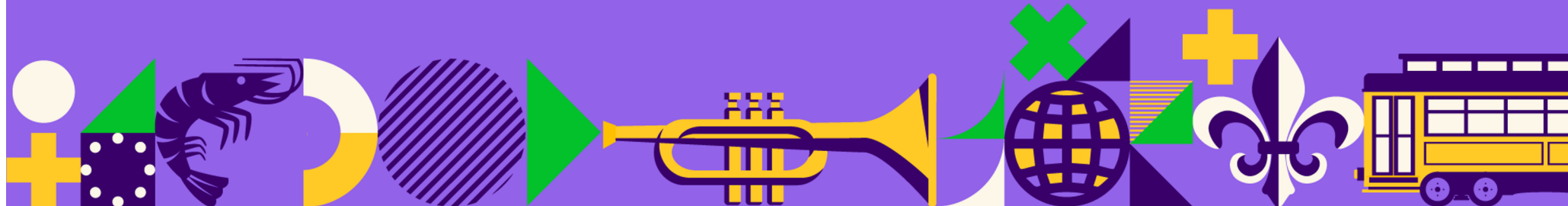
Mike Beedle

Agile Manifesto Signator (He suggested to use the term Agile at the agile Manifesto gathering),
The first person to implement Scrum at the Enterprise Level, Creator of the Enterprise Scrum.
Mike and Ken Schwaber wrote the first book on Scrum – Agile Software Development with Scrum, pub 2001

How I met Mike …

- **2016** – Met **Mike Beedle** when he came to NYC to introduce the new and improved **Enterprise Scrum for Biz Agility**

- Made Changes to **Scrum** & **Enterprise Scrum** for Business Agility

- Intrigued by his approach of Scaling Scrum

- **2017** – I became an **Enterprise Scrum Instructor**

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Mike's Approach to Scaling Scrum

- Revolutionary – Applied the subsumption architecture to the organization design to truly enable agility.

- Mike was killed in the back alley of Chicago in March 2018.

- Journey for me since his passing to piece together …

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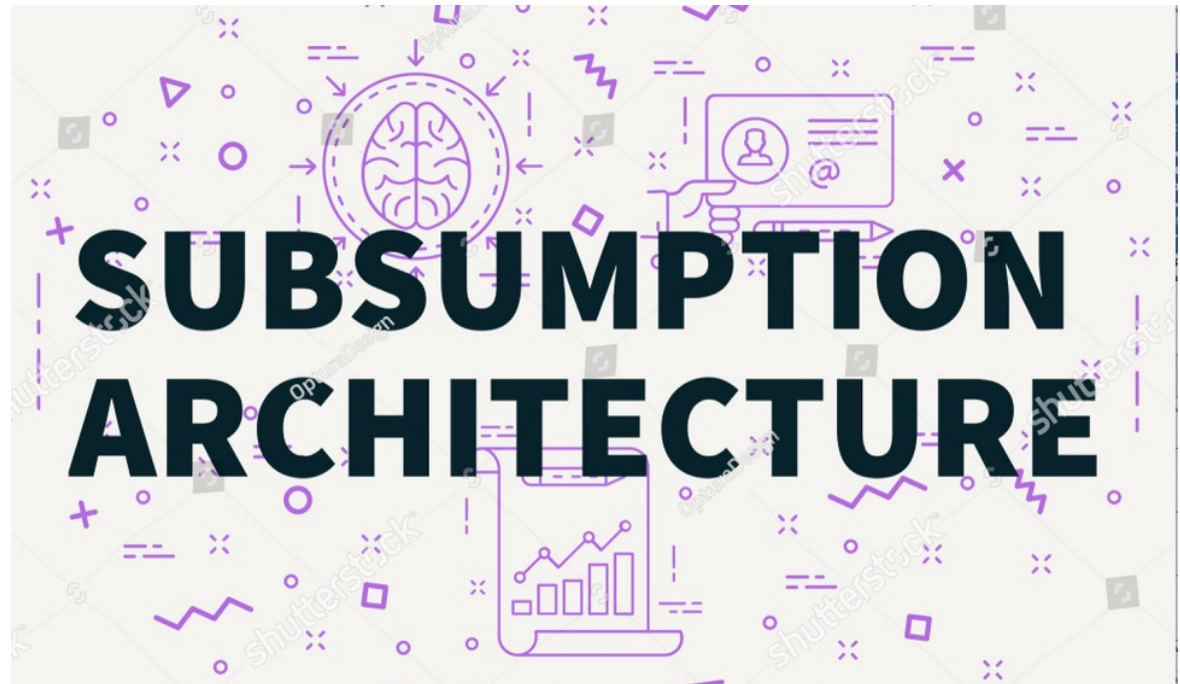
Why Subsumption?

Autonomy, Autonomy, Autonomy

Foundation, Essential. W/o Autonomy, No Scrum Benefits. Without Autonomy, Scrum at Scale is not Scrum, Built on Sand .

Decentralized Decision Making Process – Own Decision, Collaborate

All at Once Management

Deliver Products **Faster to Market**

Synergy & Alignment throughout the whole organization

Survival & Profits! To survive in the disruptive env, - adapt quickly to respond to the changes.

What is the BIGGEST Challenge for Scaling Scrum?

Managing Interdependencies

Dependencies

    EAT

        Autonomy

        Lack of autonomy leads to

            Less Empowered Teams

            Not Committed

            Not Accountable

            Low Morale

        All these create

            Bottlenecks

        Lead to

            Delays!

Scrum just BREAKS DOWN!

Many Scaling Frameworks,
SAFe, LeSS, Scrum@Scale, Nexus,
manage dependencies

BY ADDING

MORE ==ROLES, MEETINGS, AND PROCESSES==

ADDING LAYERS OF HIERARCHY WHERE ==DECISIONS FLOW FROM TOP TO BOTTOM==

==These Centralize the Decision Making Processes eat Autonomy and introduce Bottleneck.==

==TEAMS become **Less AGILE!** !==

==**RESULT IN DELAY**!==

We often hear
Don't Scale & Descale!

One way to **decentralize the decision making process by flatting the hierarchy!!**

Flat Organization - No Hierarchy

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The problem isn't the **hierarchy itself**.

The problem arise when we don't know <mark>how to decentralize decision making as we add layers.</mark>

As you will see in this webinar, the subsumption architecture **facilitates the decentralized decision making process.**

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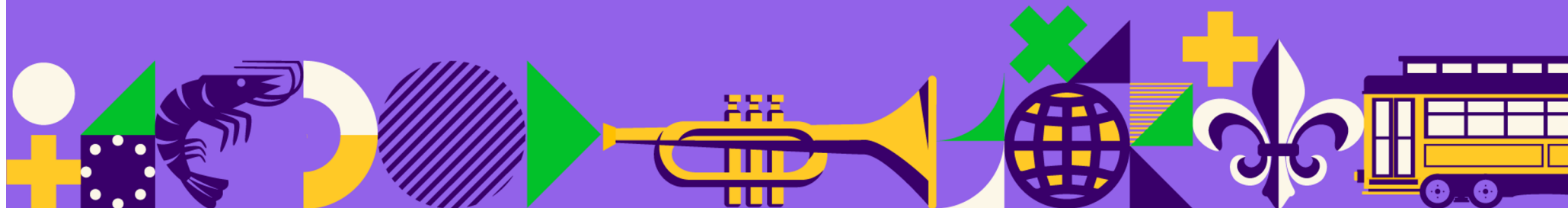
The Hierarchy in the subsumption architecture

Is **not a command and control hierarchy** where lower layers wait for higher layers to make decisions

Rather it is "**Informed and Decide**" where each layer is responsible for executing its own as well as deciding whether to subsume the lower layer or not.

This is how Robot is able to respond dynamically in real time.

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Do you know
what inspired Jeff Sutherland to
create Scrum?

Subsumption Architecture

# How Jeff Sutherland learned about Subsumption Architecture?

In early 1990, Jeff Sutherland rented an office space to iRobotics. Prof. **Rodney Brooks** , the creator of the subsumption architecture, and his team were building robots. Jeff's interaction at first hand.

A Radical discovery after 30 years of trying to build a robot using an intelligent system. The best they had been able to do was a smart chess program. Then he and his team discovered the Subsumption architecture. A Game Changer.

How does a Robot explore the world?

Hierarchical Subsumption Layers for Explore World
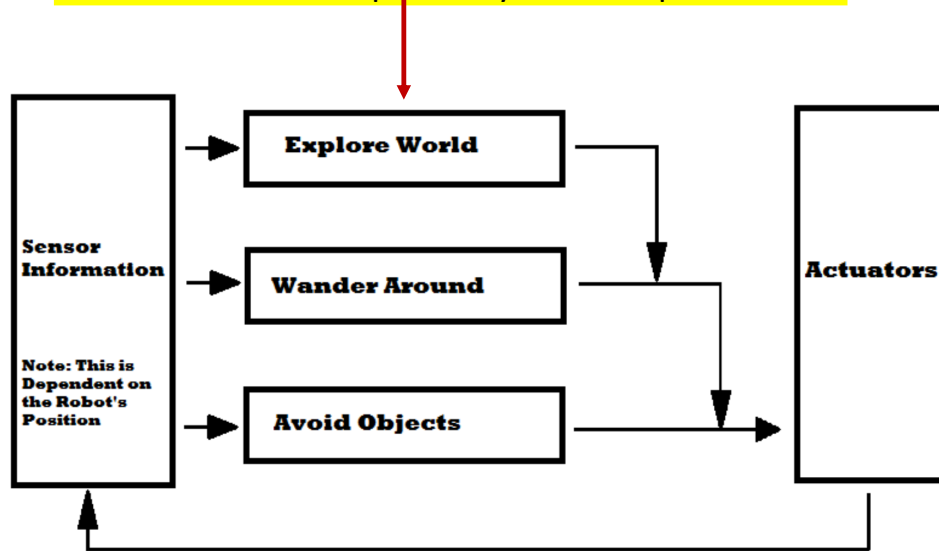
A robot must be able to know **how to avoid an object** before it can **wander around**. Once it can wander around, it can then **explore the world**.

Now, this **behavior of explore world** is divided into 3 hierarchical layers - Avoid Objects-> Wander Around-> Explore World where Avoid Object is on the lowest hierarchical layer.

.

Two more functions of the Subsumption Sensor & Actuators

Subsumption Layers of Behavior
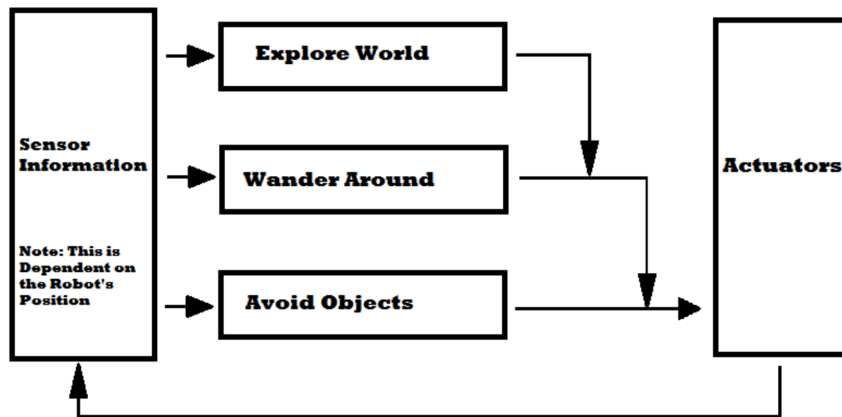
Sensor – Key role - Monitors its **surrounding** and Send the most recent and relevant **signals** to layers
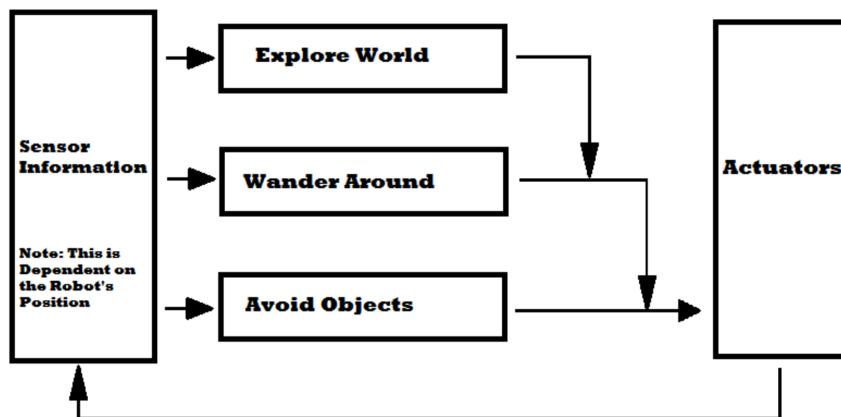
Layers – Receive the signals from the Sensor and activate Actuators based on the signals they received from the Sensor

Actuators – **Carry o**ut the actions - based on what have been activated by the layers.

All working together to respond in real time. No Central Processor!

How does a Robot avoid hitting a wall while it roams?

Subsumption Layers of Behavior

As the robot roams and when it is about to hit a wall, the sensor sends a signal to all the layers that it is about to hit a wall.

Wander Around gets the signal and decides whether to avoid the wall or not. To avoid the wall, it decides to subsume(use) lower layer - Avoid Objects and then Actuators to carry out its wish to avoid the wall.
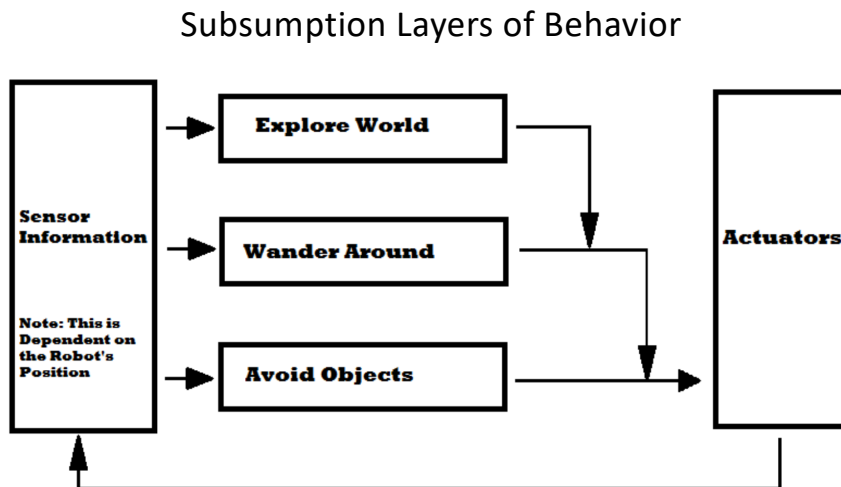
All work together – Sensor + Layers + Actuators

All working together to respond in real time. No Central Processor!

Let's talk about ==what I mean by subsuming ...==

Subsumption Layers of Behavior

Not a "==Command and Control==" relationship

But "==Informed and then Decide"== relationship.

So, When a robot is about to hit a wall,
Sensor sends signal to all the layers – both Wonder Around and Avoid Objects get the signal.

Now, Wander Around has to **decide whether to avoid the wall or no**t. If it wants to avoid the wall, it subsumes the lower layer - Avoid Objects.

Now, Avoid Object **does not wait for a command** from Wonder Around rather, it is ready to avoid the wall when it gets the signal from the sensor and only if it is activated by Wonder around, Actuators carry out the behavior of avoiding the wall.

==This is how it provides autonomy on each layer.==

Key Functions of the Subsumption Architecture

Hierarchical Subsumption Layers - A complex behavior divided into **subgroups** and higher layers **subsume** lower; Not a command-and-control but informed-and-decide relationship.

A very Essential part of the architecture.
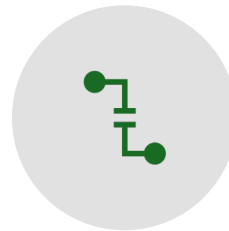
Sensor – Monitor surrounding and send signals to various layers
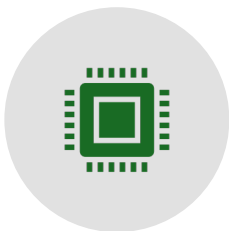
Actuator – Act appropriated to the most recent and relevant information it has in real time

Learning from past behavior – Blank chips are inserted into a Robot and it collects data as it roams and learned from them.

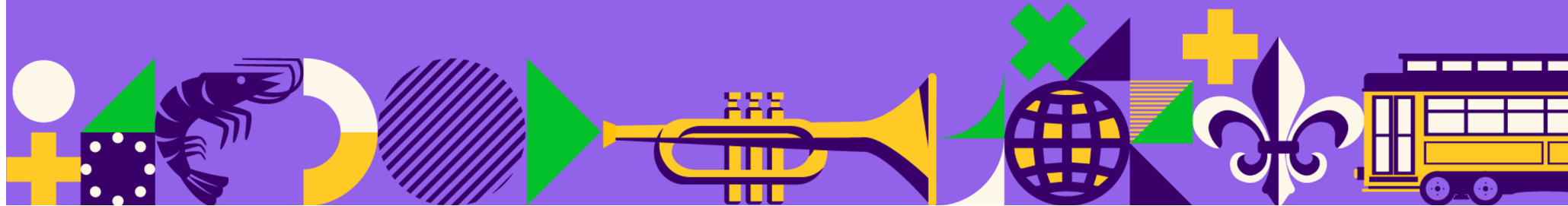**No Central Processor – All work together**

Decentralized Decision Making Enables Autonomy so it to respond to the real world dynamically!

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How might we apply the Subsumption Architecture for Agile Scaling?

Let's go through an example of applying the subsumption architecture for eAuction, Inc.

eAuction, Inc

Specialized in providing **online auction service**s. First to **Airline companies** - Passengers with **existing bookings** are invited to upgrade their seats through online bidding.

Win-win for both - **passengers the chance to enjoy a more luxurious** flying experience at a potentially discounted price. **Airline Companies** to maximize revenue by selling unsold premium seats.

Expanding – **Musicians** like Taylor Swift to sell concert tickets, and just **Artists** to sell their paintings and **Sport Organization** like FIFA to sell World Cup tickets

eAuction's Mission

To revolutionize the auction experience by offering a dynamic online platform that specializes in providing **innovative bidding solutions**.

Our mission is to empower **our customers to maximize their sales** through online auctions while **also providing users with affordable opportunities to participate and connect with their passions**.

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eAuction's **Design Criteria**

1. Craft a **customer-centric design** providing tailored solutions for each customer segment. Prioritize first affordability and then loyalties for end users while empowering our customers to thrive. Our customers include airlines and theater productions, and with artists recently added to the list.

2. Design a structure that fosters **a culture of ownership and accountability** by empowering teams to make informed decisions and take ownership of their responsibilities.

Workshop instructions

- ➢ Group Size: Up to 6 people per table
- ➢ Organize the Lego cards to **design the structure** of eAuction, Inc.
- ➢ **Each Lego card** represents an **Agile Team** within the company.
- ➢ We will go through **three stages** to simulate how the organization **scales as it grows**.

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Getting Started

➤ **A set of Lego cards** will be used at **each stage of the scaling process**. Select only the necessary Lego cards to represent the Agile Teams needed for each stage of the organization. **Not all cards are required**—choose wisely based on the demands of the customer segments.

➤ Ensure your team structure is designed to meet eAuction's **design criteria:**

  ➤ Customer-Centric
  ➤ Empowerment and Accountability by applying the Subsumption architecture

Stage 1
<mark>Online Auction Services for Airline Customers</mark>
15 minutes

In this initial stage, you are to create an organization structure that

➢ Provide online auction services tailored specifically for **airline customers**.

➢ These services may include **auctions for unsold seats, upgrades**, or special offers for passengers.

➢ Use the **Lego Cards Set marked with "Stage 1"**

➢ Choose only Card that are needed at this stage

➢ Lay them hierarchically on the table with the Image side on the top

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Auctions Team

This is just for demonstration not in the right hierarchical order!

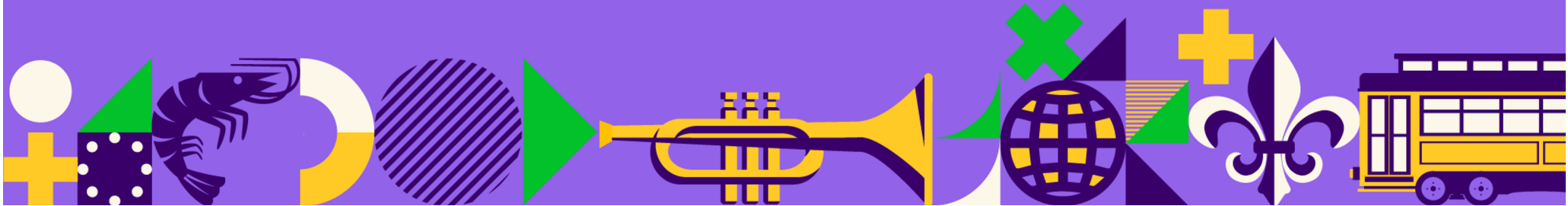**Company Marketing & Sales Team**

Concert Marketing & Sales Team

Airlines Marketing & Sales Team

How did it go?

Bottom up approach - Subsumption Layers
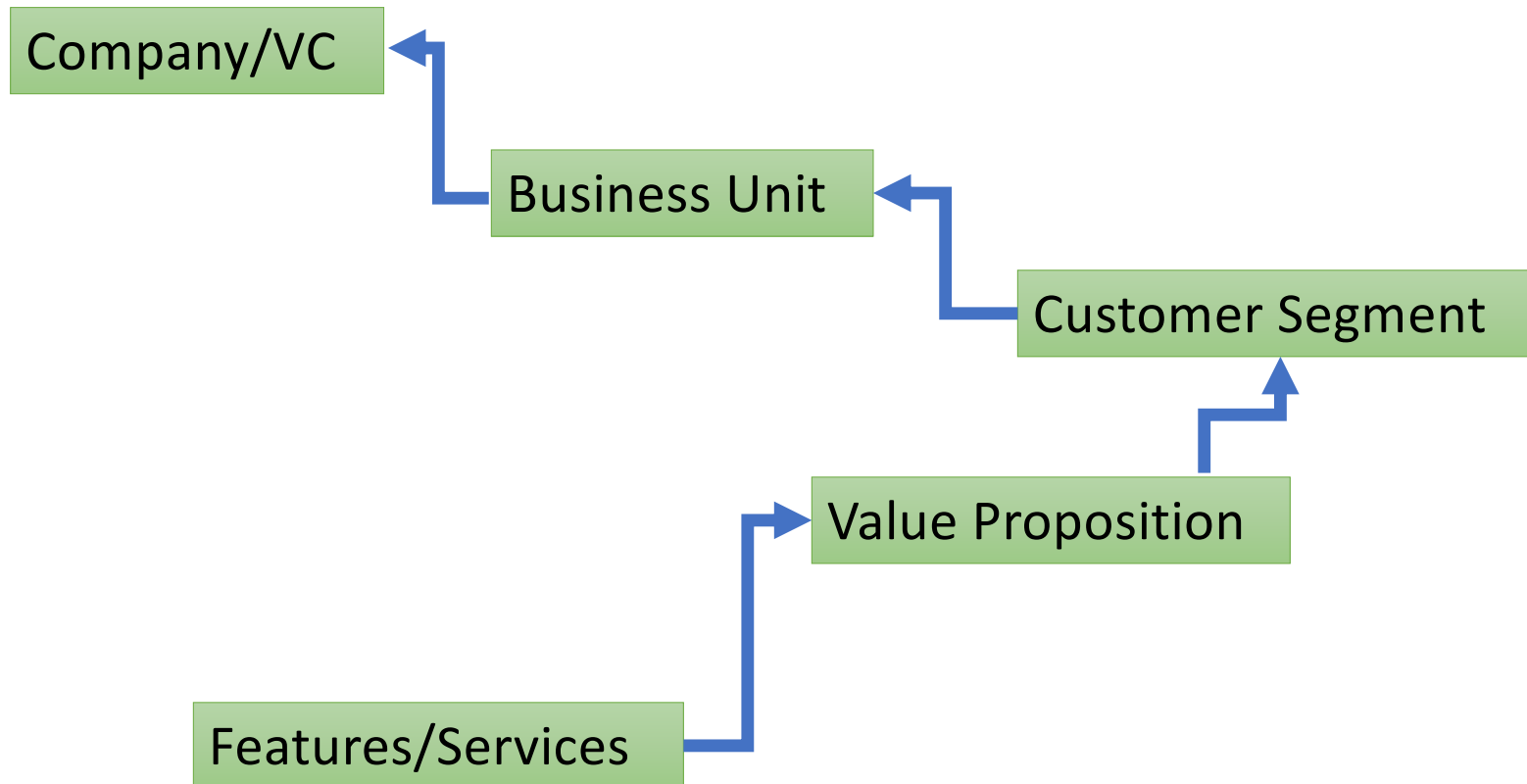
How to design for eAuction using the subsumption architecture

Leadership

Painting a clear vision for the company

Biz Unit

Developing and Implementing objectives for airline customers

Airline Customer Segment

Generating value propositions tailored for airline companies

Airline Auction Team

Providing the auction application for airline passengers – Services like Bidding for upgrades

Airline Marketing and Sales Team

Developing marketing and sales strategies and tactics for both passengers and airline companies

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31

Stage 1

eAuction Leadership

Biz Unit - Ticketing

Airline Customer

Airline Auction

Airline Marketing & Sales

Stage 2
==Expansion to Music Stars and Fan Engagement==
10 minutes

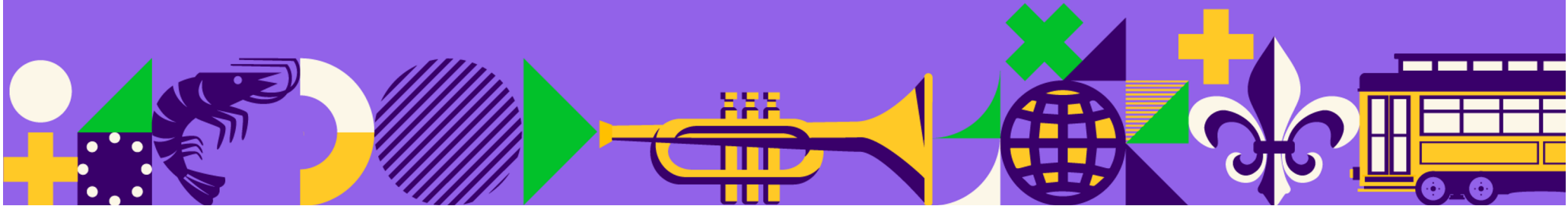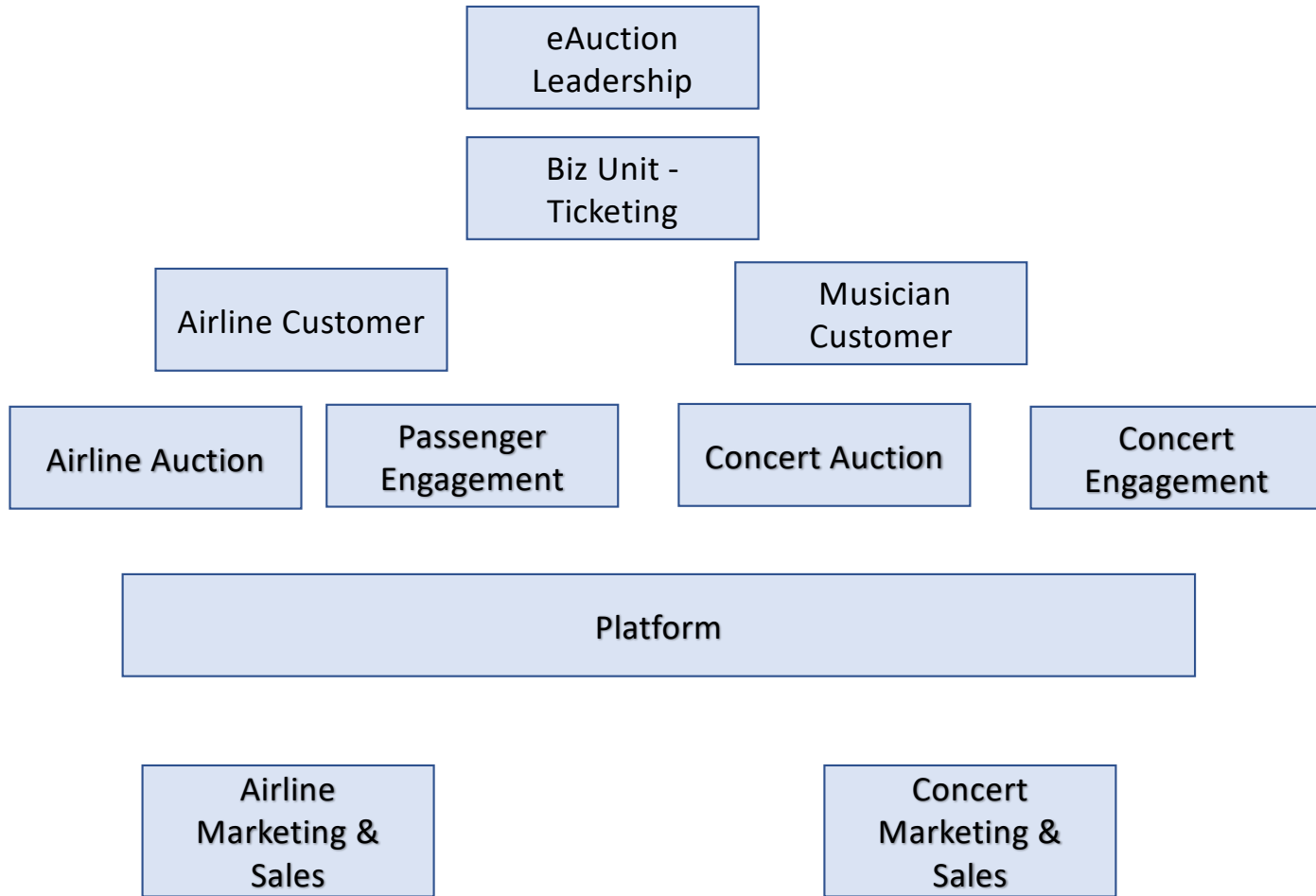At this stage, eAuction is expanding its customer base to include **music stars** like Taylor Swift & offer **new services to engage and entertain** both **music fans and airline passengers**.

➢ **Scale the organization structure** to
  ➢ Serve this new customer segment – **Musician,** tailored specifically pop stars like Taylor Swift
  ➢ Add **online auction services** for unsold concert tickets, upgrade and more for **music fans**
  ➢ Add the services **to engage and entertain both airline passengers and music fans**

➢ Use the **Lego Cards Set** marked with **"Stage 2"**

➢ Choose **only Card** that are needed at this stage

➢ Scale it to meet their growth while keeping the design criteria – **Customer Centric & Culture of Ownership & Accountability.**

How did it go?

Stage 2

eAuction Leadership

Biz Unit - Ticketing

Airline Customer

Musician Customer

Airline Auction

Passenger Engagement

Concert Auction

Concert Engagement

Platform

Airline Marketing & Sales

Concert Marketing & Sales
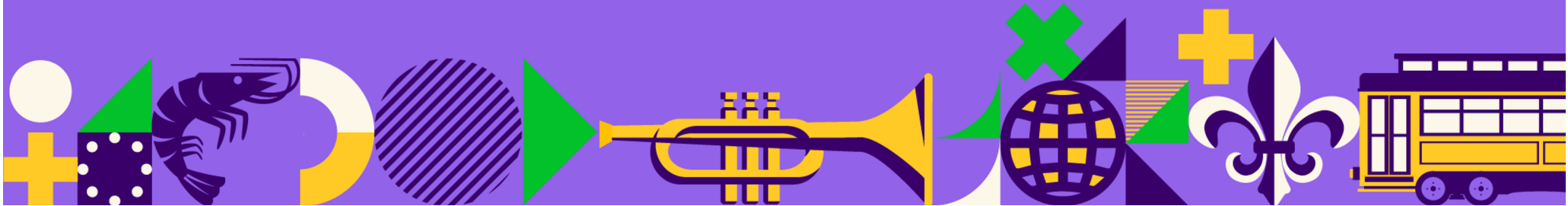
Stage 3
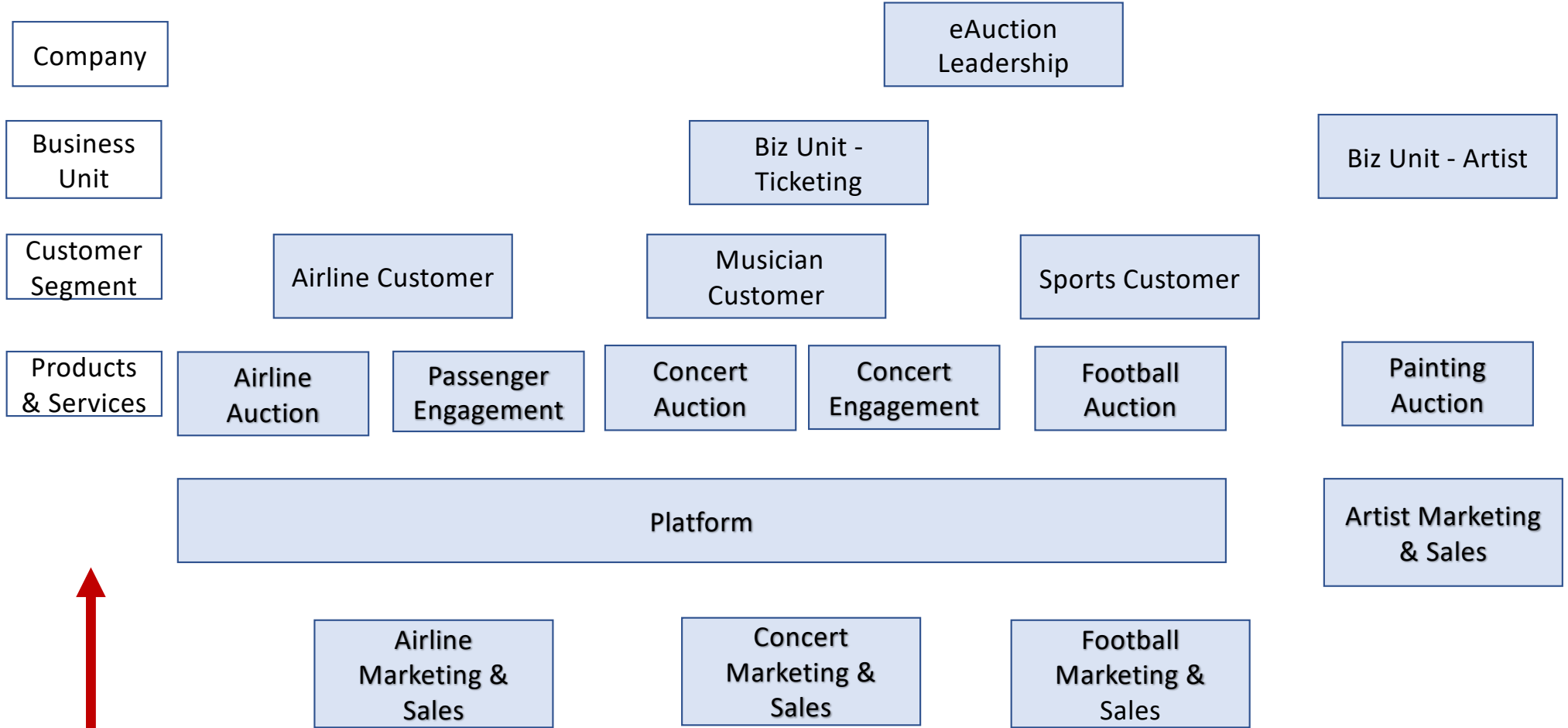# <mark>Further Expansion to Sports Organizations and Artists</mark>
10 minutes

At this stage, eAuction is expanding its customer base to include two new customer segments: **Sports organizations like FIFA & Artists**.

➢ **Scale the organization structure** to
  ➢ Serve two new customer segment tailored specifically for them.
  ➢ Provide **online auction services** for **football enthusiast** to bid for seat upgrades and purchase last minute seats.
  ➢ Provide **online auction services** that enable **art enthusiasts** to bid and purchase painting.

➢ Use the **Lego Cards Set marked with "Stage 3"**

➢ Choose only Card that are needed at this stage

➢ Scale it to meet their growth while keeping the design criteria – **Customer Centric & Culture of Ownership & Accountability**

How did it go?

Company

eAuction Leadership

Business Unit

Biz Unit - Ticketing

Biz Unit - Artist

Customer Segment

Airline Customer

Musician Customer

Sports Customer

Products & Services

Airline Auction

Passenger Engagement

Concert Auction

Concert Engagement

Football Auction

Painting Auction

Platform

Artist Marketing & Sales

Airline Marketing & Sales

Concert Marketing & Sales

Football Marketing & Sales

Subsumption Layers

10/15/14

Add other services like Governance and so on ...

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Company					eAuction Leadership				

Business Unit			Biz Unit - Ticketing				Biz Unit - Artist	

Customer Segment		Airline Customer		Musician Customer		Sports Customer		

Products & Services	Airline Auction	Passenger Engagement	Concert Auction	Concert Engagement	Football Auction	Painting Auction

Platform

Painting Marketing & Sales

Airline Marketing & Sales

Concert Marketing & Sales

Sports Marketing & Sales

Governance

Compliance

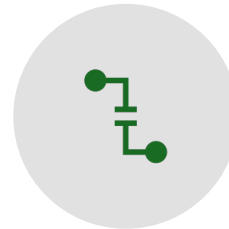Supporting

Talent Harmony

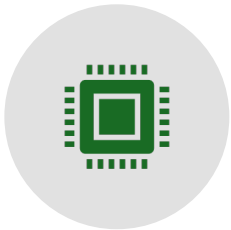Transformation

Subsumption Layers

Sensor's function for Agile Scaling

Hierarchical Subsumption Layers – to the Org. Design - Customer Segments as the basis. – Product & Services -> Value Propositions -> Customer Segments -> Business Unit -> VC

Sensor - Visualize everything through Canvases – For every teams

Collaborators & Andon as Signal

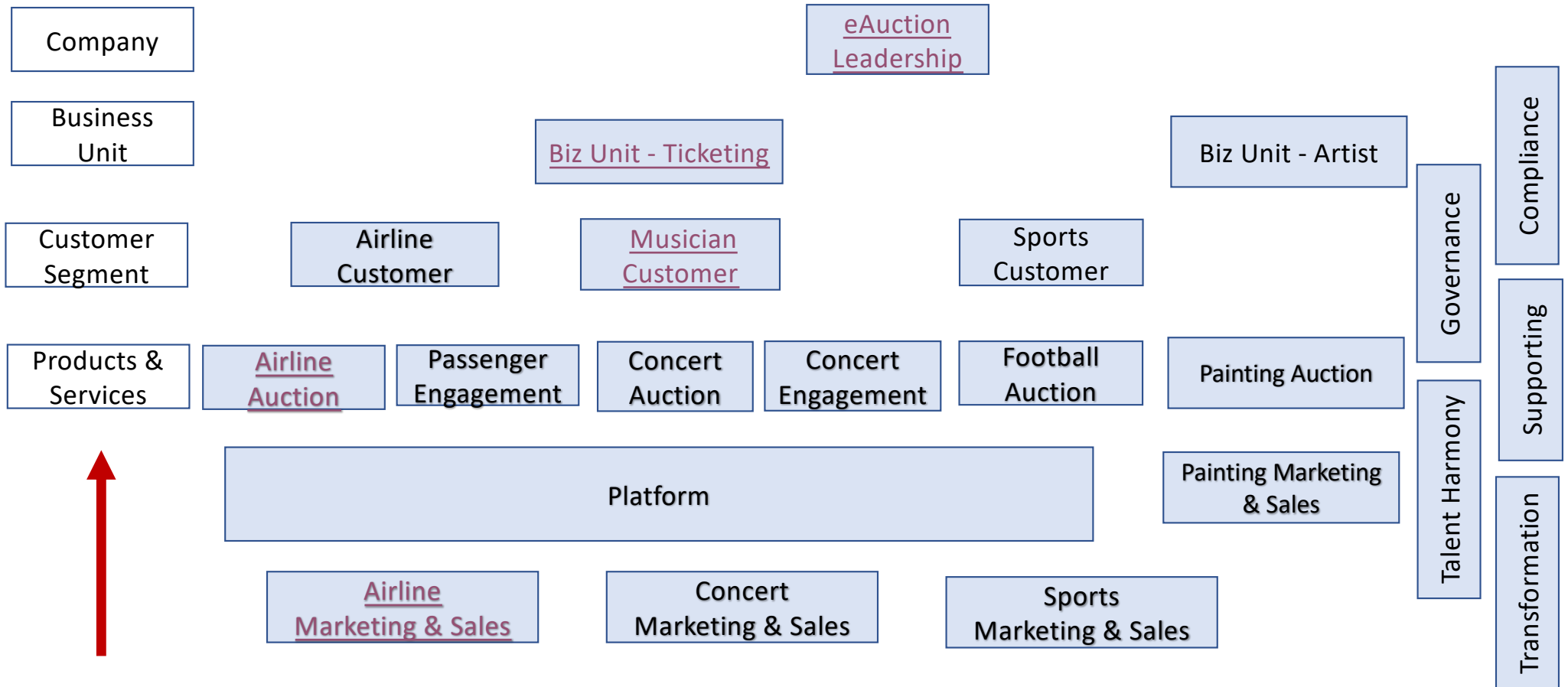Notifications – Get & Send Messages (Sue Ryu)

Incorporated into Subsumption Layers

Actuators –

Learning from past behaviors as it collects data – Scrum – Transparency, Inspect & Adapt

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Company

eAuction Leadership

Business Unit

Biz Unit - Ticketing

Biz Unit - Artist

Compliance

Customer Segment

Airline Customer

Musician Customer

Sports Customer

Governance

Products & Services

Airline Auction

Passenger Engagement

Concert Auction

Concert Engagement

Football Auction

Painting Auction

Supporting

Platform

Painting Marketing & Sales

Talent Harmony

Transformation

Airline Marketing & Sales

Concert Marketing & Sales
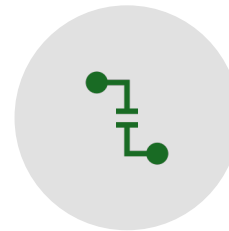
Sports Marketing & Sales

Subsumption Layers

The **implementation of Sensor – Visualization On Steroid**. Canvases for every teams and collaborators.
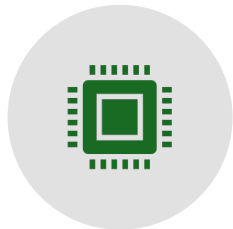
Actuators & Learning from the past behaviors

Hierarchical Subsumption Layers – to the Org. Design - Customer Segments as the basis. – Product & Services -> Value Propositions -> Customer Segments -> Business Unit -> VC

Sensor - Visualize everything through Biz Model Canvases

Broadcast messages (Sue Ryu)

Alter using an Andon

Actuators – Teams doing the work

Learning from past behaviors as it collects data – Based on Scrum – Transparency, Inspect & Adapt apply.

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What factors to use as a base for subsumption?

Customer Segments as we did for eAuction. This is recommended by Mike Beedle especially for innovative and new product developments.

Geographic – Giving Autonomy to each region or area

Do Not base on Functional, Develop-deploy, Front and Back. These tend to create functional silos that don't serve the customers well.

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Mike said

- "In Enterprise Scrum, we generalize the 2-level subsumption architecture behavior of Scrum into an n-level."

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Scrum@Scale Framework

<mark>Hierarchical Layers</mark> on Meetings and Roles

- More Meetings
  - Scrum of Scrums, Scrum of Scrum Team
- More Roles like
  - Executive Action Team, Executive MasterScrum
- Without any guidance as to how you layered them
- <mark>What is worse</mark>:
  - Siloed into What(Requirement) and How(Development), like what we used do in the waterfall time

HOW   What

Instead of uniting
Dividing them bet Req and Dev
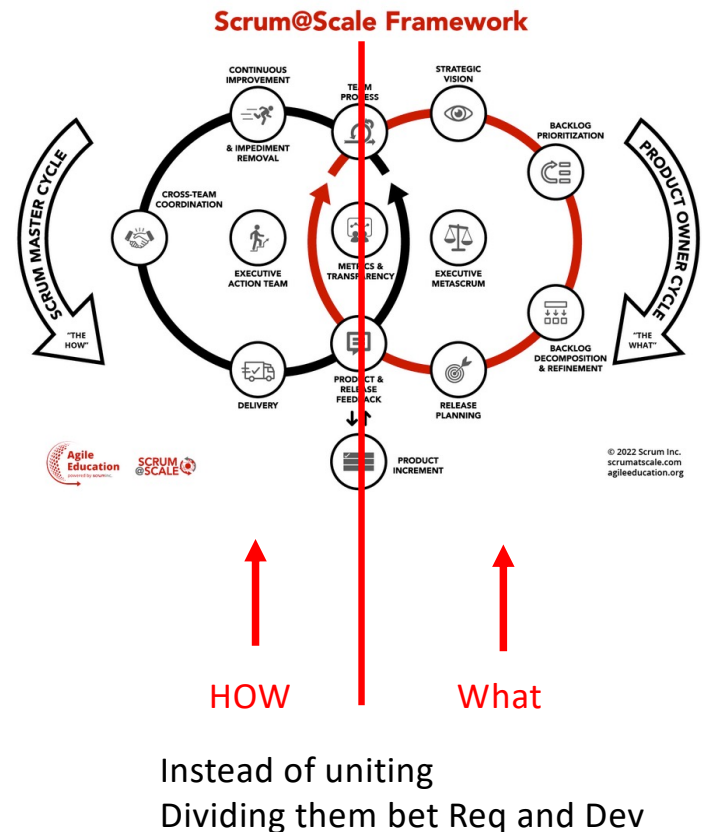
Many other Scaling Frameworks - Nexus, LeSS, others

Do not expand 2-level subsumption behavior of Scrum into N-level.

As you have seen in this webinar, if we apply n-level subsumption, you would get the same benefits as you had with one team.

Who is using the subsumption architecture for scaling?

❖ CVS Care Mark

❖ **Livelo** in Brazil

- Cihangir Deniz Ozdemir
- Betting Company
- One of the biggest Loyalty & Reward Programs in Brazil
- Enterprise Scrum 2017 - 2019

❖ Aha Autonomy

Benefits

<mark>Autonomy, Autonomy, Autonomy –</mark> Foundation of Agility – Agility Requires Autonomy. AhaAutonomy

Decentralized Decision Making – Not command and control But Inform and Decide by higher layers

All at Once Management – Just like a Robot is responding dynamically in real time.

Faster Time to Market

Synergy & Alignment throughout the whole organization

Happy teams, customers, stakeholders

<mark>Survival & Profits</mark>! - creates an environment for teams to be autonomous so they can adapt and respond to changes quickly.

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What is the **biggest** takeaway?

A) Decentralizing decision-making for scaling.

B) Enabling Autonomy through Subsumption.

C) Designing for Customer Centric Org.

D) Other

You can select up to 2!

What is the biggest challenge for applying the subsumption in one or two words?

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Enterprise Scrum for Business Agility

So much more in Enterprise Scrum

Business Agility

Naming Convention for not just software teams for an entire organization

Business Owner, Coach, Cycle

Structural patterns that would guide you with scaling
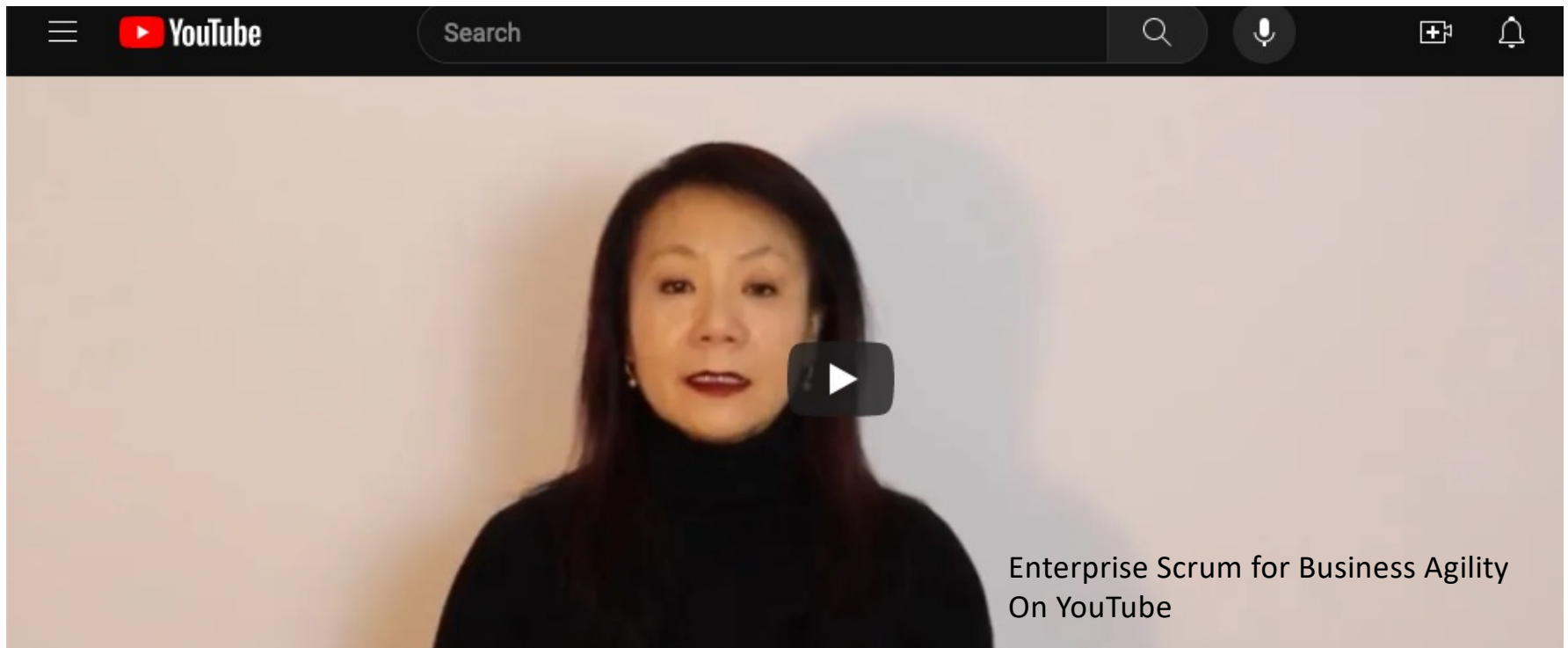
Based on Patterns

Pluggable & Configurable

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Enterprise Scrum for Business Agility on YouTube

Enterprise Scrum for Business Agility
On YouTube

What is your biggest takeaway (in one or two words)?

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Unleash Agility with Subsumption Architecture

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https://www.linkedin.com/in/sueryu/

The slides are available at
www.AhaAutonomy.com/nola

- Thank you for spending the time with us today to explore the power of subsumption architecture.

- Look at how decision are made at your organization?
  - Are there bottlenecks?
  - Are teams waiting for someone to give a green light?

- Dependencies impede autonomy. We need autonomy for Agility.

- So, I ask you to try the subsumption architecture to untangle the dependencies for your organization to thrive in the VUCA market.

- Let's revolutionize how we approach agility together.