

# Global Distributed Manufacturing of Personalized Products as a Service

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**blue sky**  
COMPETITION

David Dornfeld Manufacturing Vision Award

# Goal

Convince the selection committee this idea deserves \$20M to \$30M of research investment.

Return on Investment:

10x: **\$200M-\$300M** Revenue / Year

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Convince the selection committee this idea deserves \$20M to \$30M of research investment.

Targeted Return on Investment of this Blue Sky Vision:

10x: \$200M-\$300M Revenue / Year

**100x: \$2B-\$3B Revenue / Year**

## My Blue Sky Vision:

**amazon** (or a company like **amazon** )  
builds the “**Global Distributed  
Manufacturing of Personalized  
Products as a Service**” in their  
operations.

I pick **amazon** because of their  
”culture”.



# Amazon Culture: Zero Net Income



Interactive Charts. Nov. 16 2013. 23:36 UTC. Powered by **guru**focus

# Amazon Culture: Motto, Compensation, and 6-Page



## Motto

- Work Hard, Have Fun, Make History
- Always Day 1

## Compensation

- 40% paid by Amazon stocks
- 2% before-tax company matching to employee's retirement fund

## Presentation/Reporting

- No PPT
- 6-page report format (similar to old NAMRC 8-page paper)

# Amazon Culture: Motto, Compensation, and 6-Page



## Motto

- Work Hard, Have Fun, **Make History**
- Always **Day 1**

There's so much stuff that has yet to be invented. There's so much new that's going to happen. People don't have any idea yet how impactful the internet is going to be and that this is still Day 1 in such a big way.

***“Day 2 is decline followed by death. That is why it is always Day 1.”***

Jeff Bezos, Amazon



# Amazon Culture: Motto, Compensation, and 6-Page



## Compensation

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# Amazon Culture: Motto, Compensation, and 6-Page



In the past –  
NAMRC paper  
was limited to  
8-page

## Presentation/Reporting

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# Top 25 Private Employers in the US in 2016

1	Walmart	2,300,000	14	Albertsons	273,000
2	<b>Amazon</b>	<b>541,900</b>	15	Wells Fargo	269,100
3	Kroger	443,000	16	AT&T	268,540
4	Yum! Brands	420,000	17	PepsiCo	264,000
5	The Home Depot	406,000	18	Cognizant Technology	260,200
6	IBM	380,000	19	Starbucks	254,000
7	McDonald's	375,000	20	Deloitte	244,400
8	Berkshire Hathaway	367,700	21	J.P. Morgan Chase	243,355
9	FedEx	335,767	22	Lowe's	240,000
10	UPS	335,520	23	TJX	235,000
11	Target Corporation	323,000	24	Ernst & Young	231,000
12	Walgreens	300,000	25	UnitedHealth Group	230,000
13	General Electric	295,000			



# Amazon's Massive Fulfillment Center



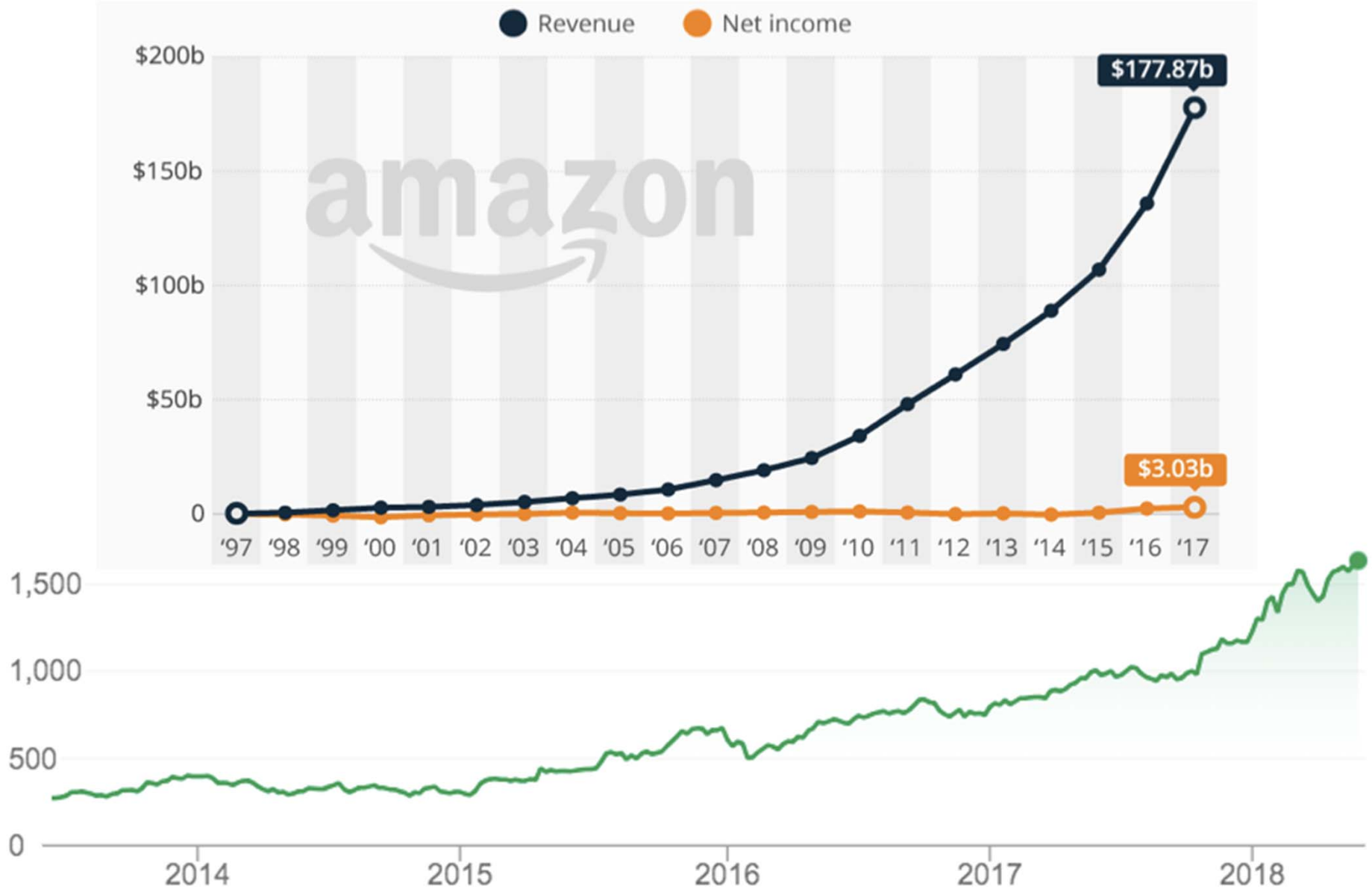


# Amazon's Massive Fulfillment Center





# Amazon in 2018



# Top 50 Private Employers in the US in 2016

1	Walmart	2,300,000	14	Albertsons	273,000					
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4	<div style="border: 2px solid blue; padding: 10px; text-align: center;"> <p>Number of employees of Amazon in 2017</p> <p><b>566,000</b></p> </div>									
5										
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**My Blue Sky Vision: \$2B-\$3B of the revenue**  
in  is from the “*Global Distributed Manufacturing of Personalized Products as a Service*”



Amazon is looking  
for new ways to  
“**make history**”

# My Plan to Reach this Blue Sky Vision

 as a NSF GOALI partner in manufacturing

**Examples and Blue Sky Visions in Three Levels:**

Level #1: Local

Level #2: National

Level #3: Global

# Level #1: Local

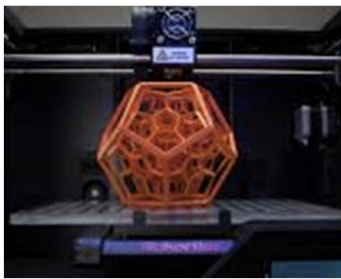
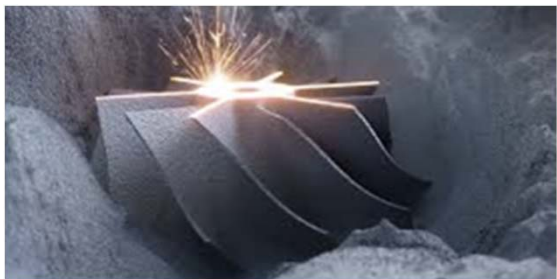
## Example: Manufacturing in the Univ of Michigan Hospital

- For over 100 years, the Univ of Michigan Hospital makes assistive devices in house for trauma patients with **quick-turn-around-time** and **personalized fit**.
- The current plaster molding based manufacturing is changing to the **cyber-based design and additive manufacturing (AM)** for custom assistive devices.
- **not an easy task – still a R&D project.**



# Level #1: Local – My Blue Sky Vision

- Integration of “advanced” manufacturing processes (additive, subtractive, incremental forming, flexible polishing, ...) and cyber-manufacturing systems
- Design for manufacturing of personalized products

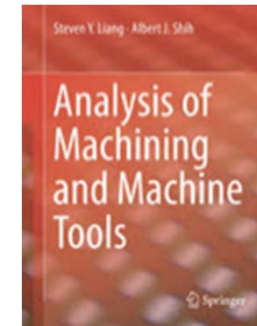




# Level #1: Local – My Blue Sky Vision

## Manufacturing of Personalized Products

- Books: Print- and Bind-on-demand



- T-shirts / hats :



- Garden tools:

Amazon has the big data to determine “what”, “when” and “where” to make these personalized products

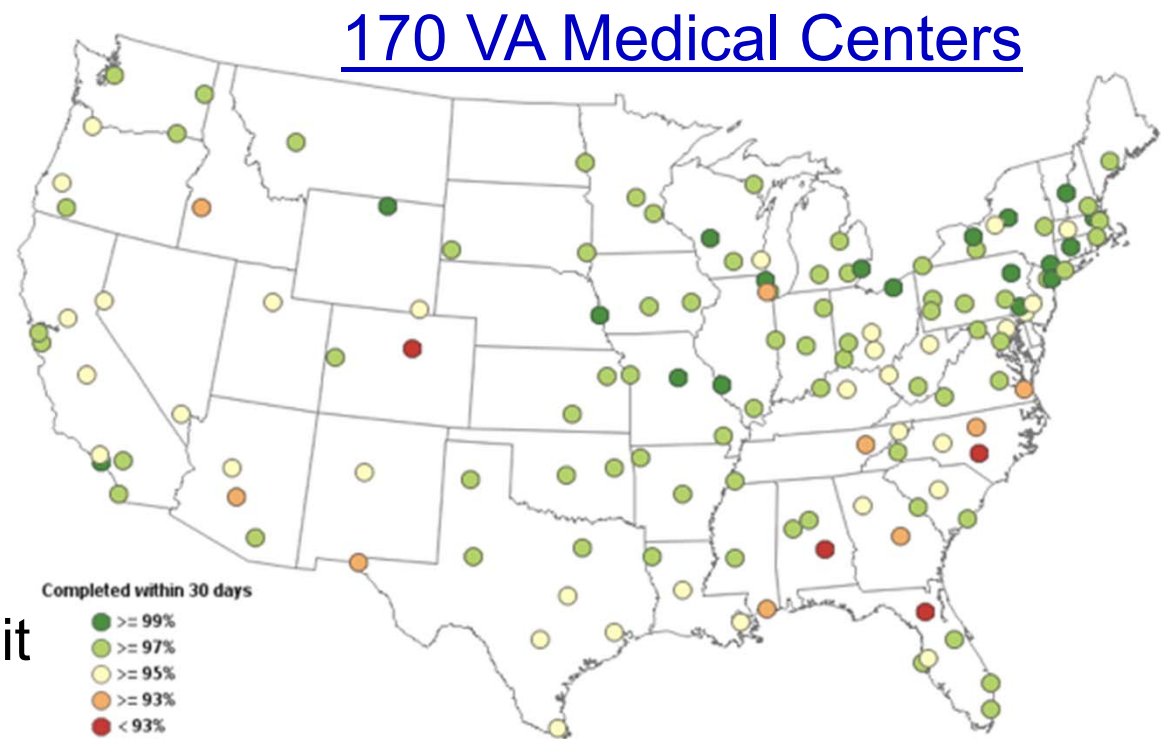
## Level #2: National – Example

### Veteran Affairs (VA) Medical Centers

VA is the largest health care provider in the US  
– 170 VA Medical Centers for 9 million enrolled veterans.

Many veterans need **personalized** assistive devices (e.g. orthotics & prosthetics)

Avg wait time





## Level #2: National – Example

### VA National 3D Printing Network

12 VA Medical Centers in the US has formed the **VA National 3D Printing Network (VA3DN)**



According to Dr. Beth Ripley (PI), VA3DN needs the **manufacturing engineering support.**

## Level #2: National – My Blue Sky Vision

### Create the “VA Cyber Manufacturing Service Center”

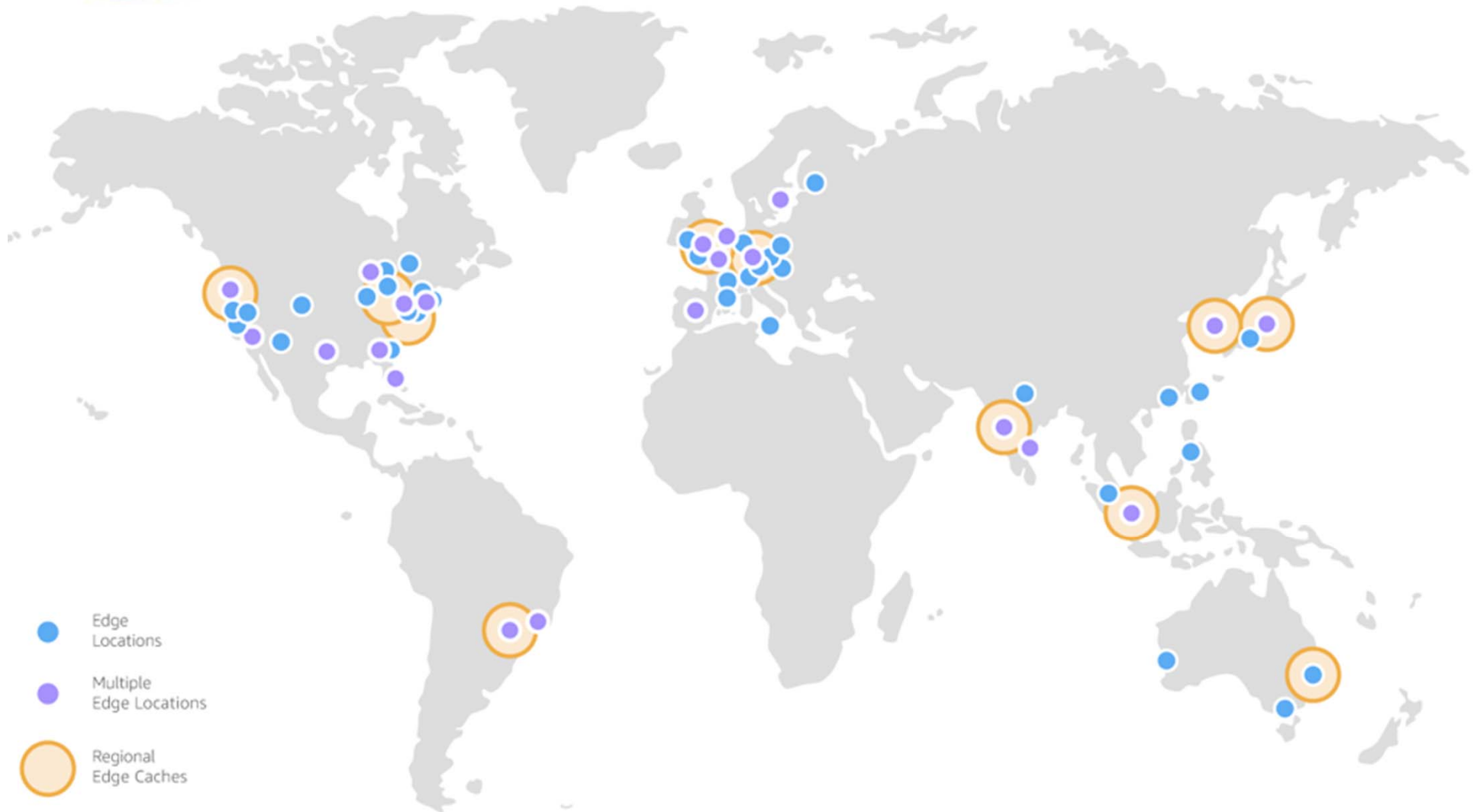
This **VA Cyber Manufacturing Service Center** will provide the cyber design and manufacturing service for personalized assistive devices to all 170 VA Medical Centers in the US.



# Level #3: Global – Example



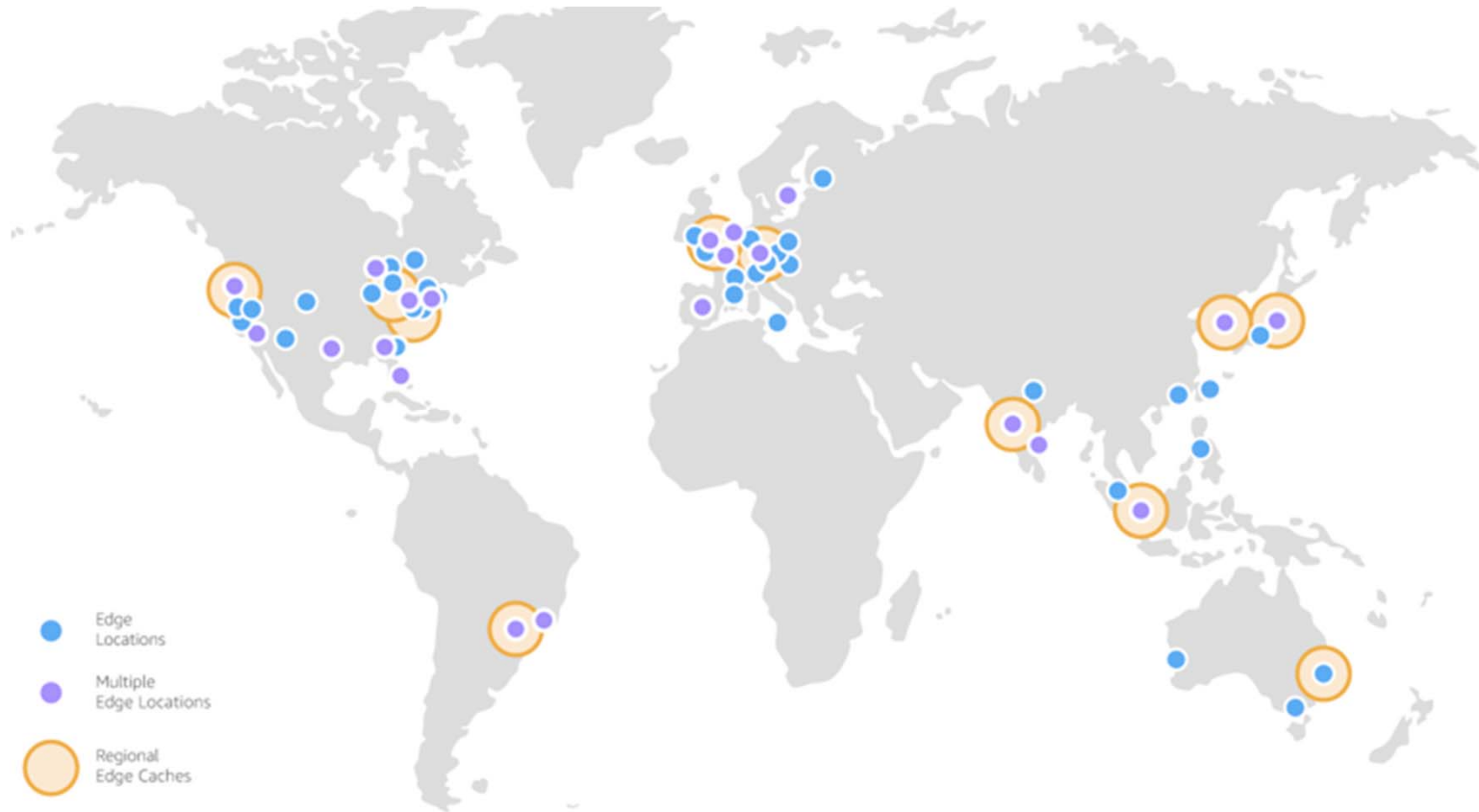
## Cloud-Front Global Locations



# Level #3: Global – My Blue Sky Vision #1



builds the *Manufacturing as a Service* (MaaS) of Personalized Products in Global Operations



# Level #3: Global – My Blue Sky Vision #2

## DoD Makes “Custom” Products in Military Bases and Hospitals Worldwide

900 US military bases outside US



# Concluding Remark:

## This is an Open Blue Sky Vision

All other Blue Sky ideas can partner with this vision:

- Manufacturing and Mass Customization using Voxel-scale Engineering Methods
- 3D Printing for Civil Infrastructure Construction
- Personalized Manufacturing: Psychology and Sociology as Fundamental Design Elements in Future Advanced Production Systems
- Metamorphic Manufacturing: The Third Wave in Digital Manufacturing
- Just-in-Time Learning for the Factory Floor
- Distributed Decentralized Rural Agile Manufacturing
- FACTORIES-IN-SPACE

**Thank You**  
**and**  
**Tribute to Dave**

