OPEN
Compute Summit

March 10–11, 2015
San Jose

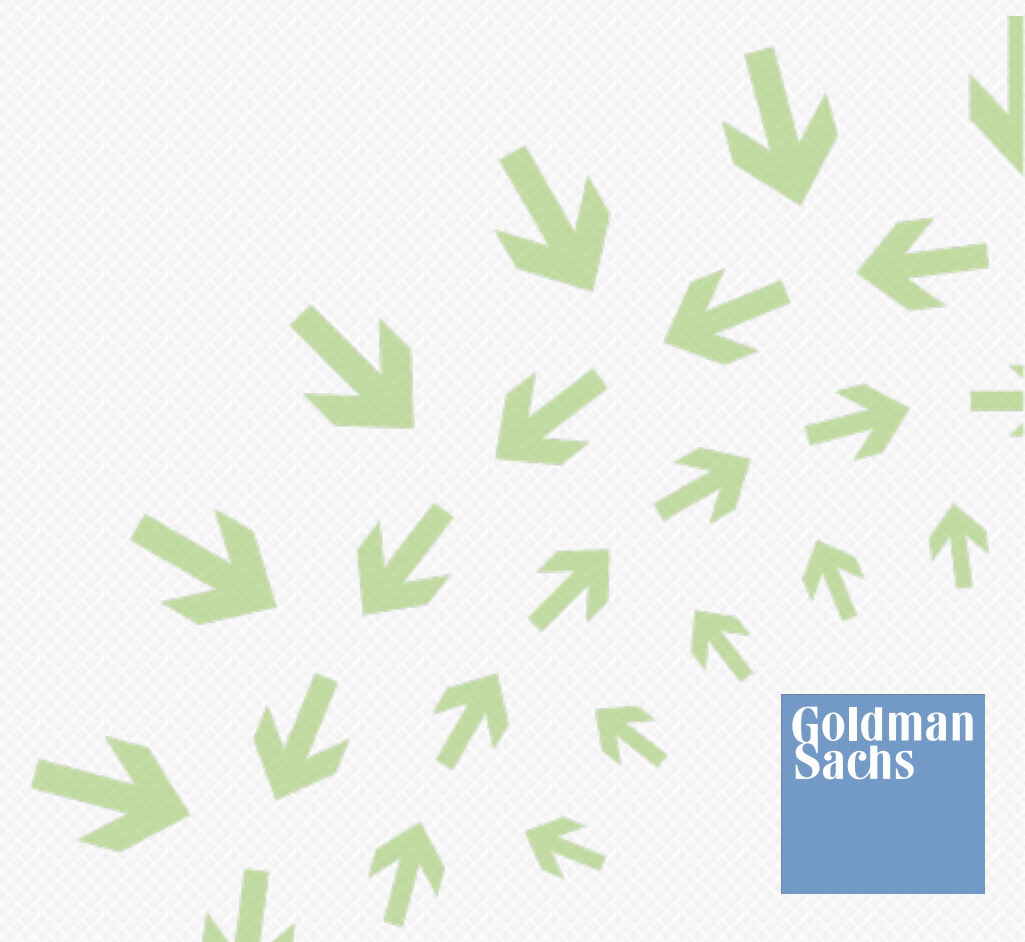**OPEN**
Compute Summit

Driving OCP Adoption in the Enterprise

Don Duet

Goldman Sachs

Managing Director, Co-Head Technology Division

www.gs.com/engineering

Goldman Sachs

EXECUTIVE TALK

"We're a technology firm, and we don't stay still."

- Lloyd Blankfein, Goldman Sachs Chairman and CEO

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Sachs

Let's Talk Technology @ Goldman Sachs

1.2 Billion Lines of Code

10 Thousand Network Devices

27 Years Distributed Architecture

500,000 Compute Cores

77 Thousand Databases

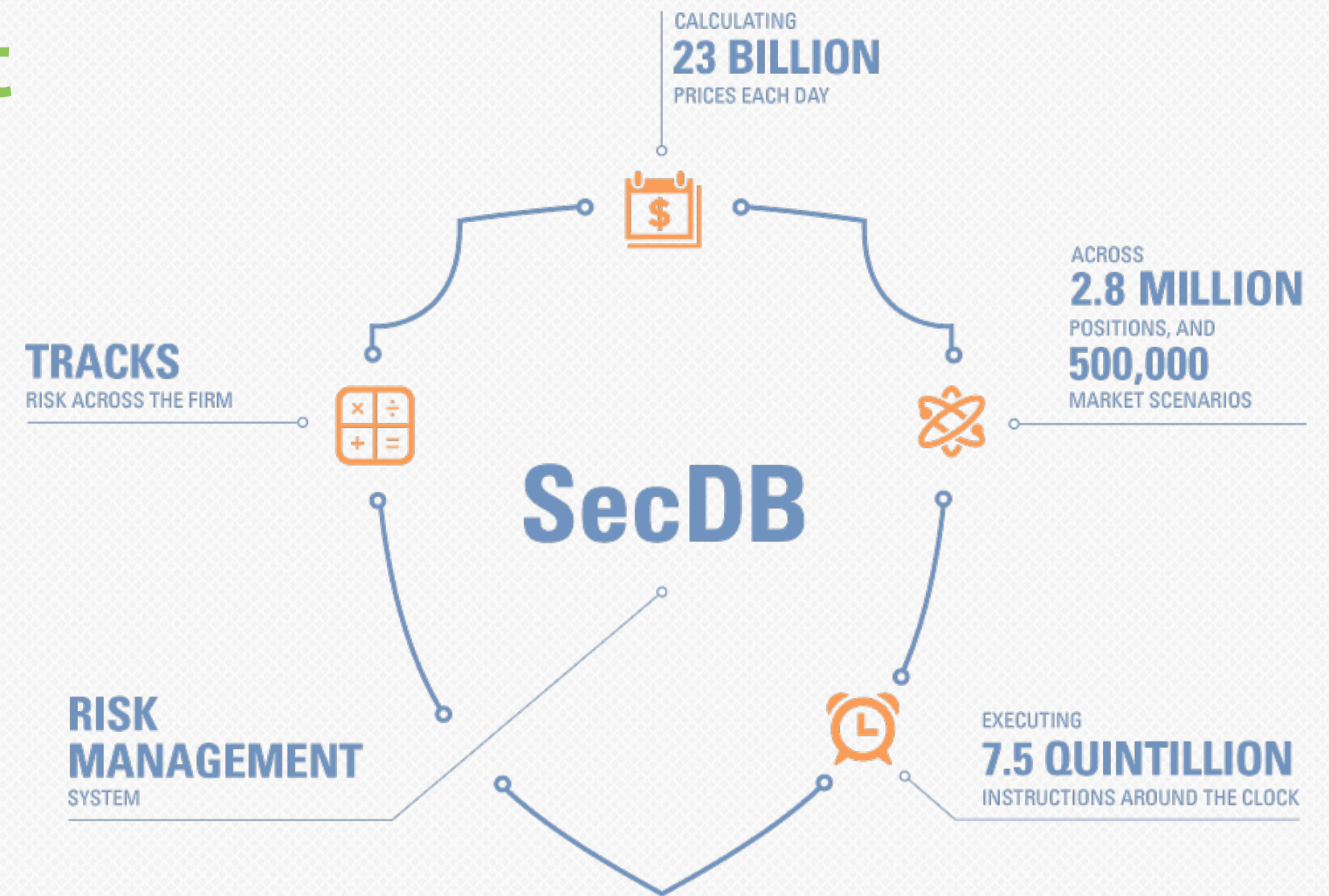**8** Thousand Engineers

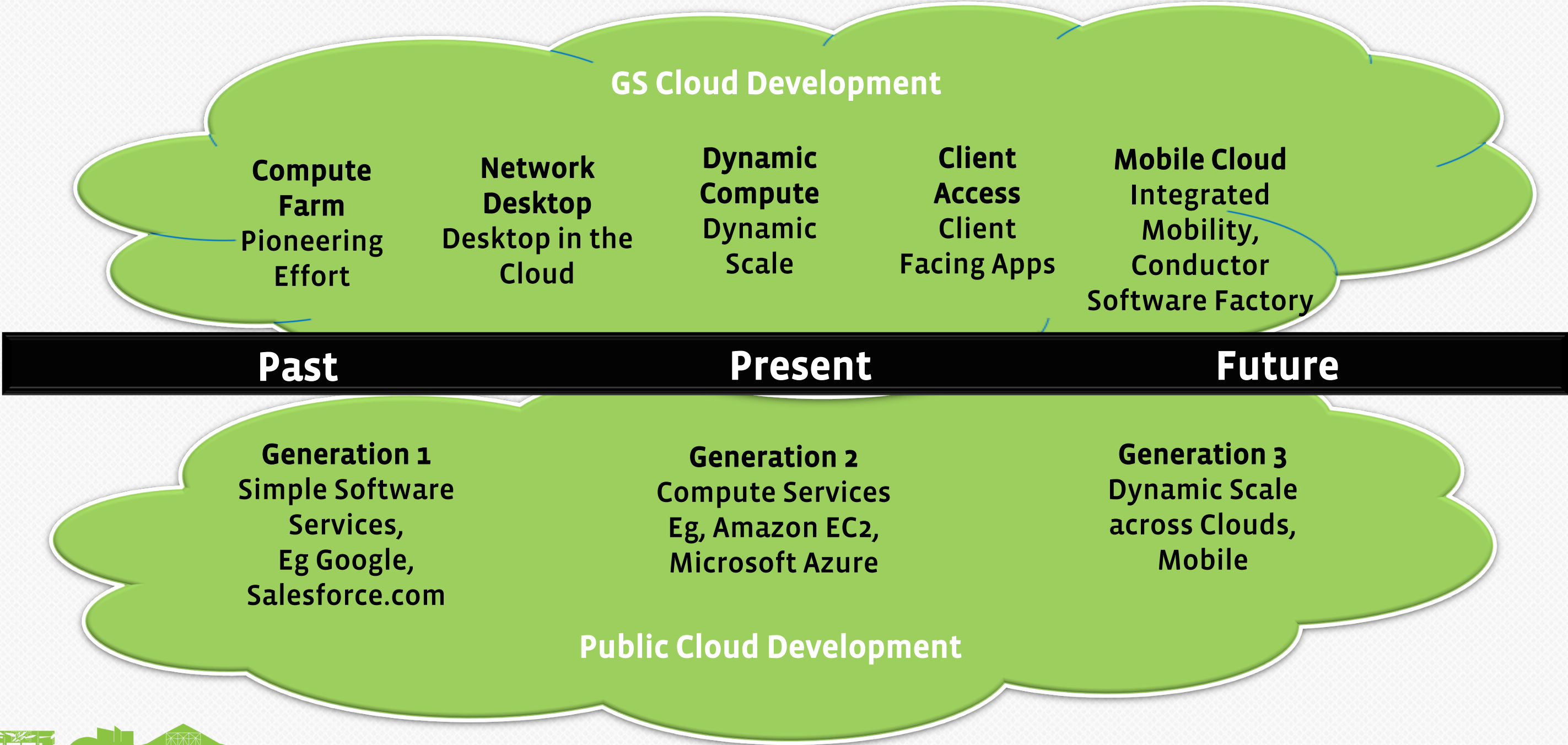Goldman Sachs

Mission Critical Applications

Real Time Risk Management

Electronic Market Making

Global Digital Client Interaction

CALCULATING
23 BILLION
PRICES EACH DAY

ACROSS
2.8 MILLION
POSITIONS, AND
500,000
MARKET SCENARIOS

TRACKS
RISK ACROSS THE FIRM

SecDB

RISK
MANAGEMENT
SYSTEM

EXECUTING
7.5 QUINTILLION
INSTRUCTIONS AROUND THE CLOCK

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A Long History of Open Architecture

GS Cloud Development

Compute Farm
Pioneering Effort

Network Desktop
Desktop in the Cloud

Dynamic Compute
Dynamic Scale

Client Access
Client Facing Apps

Mobile Cloud
Integrated Mobility, Conductor Software Factory

Past | **Present** | **Future**

Generation 1
Simple Software Services,
Eg Google, Salesforce.com

Generation 2
Compute Services
Eg, Amazon EC2, Microsoft Azure

Generation 3
Dynamic Scale across Clouds, Mobile

Public Cloud Development

Goldman Sachs

A Long History with OCP

Goldman Sachs attends OCP formation and issues press statement supporting

Partners for formation of Hardware Management Track

Assists with C&I Track creation

2011 | Open Compute Project | 2015

Goldman Sachs is a founding member of the Board of Directors of the Facebook Open Compute Foundation

Works with financial and other members on 19" Intel & AMD form factor contributions

Deploy OCP form factors in production

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OCP in the Enterprise

Our Journey to Adoption

Key Challenges

1. Greenfield – Brownfield

2. Provider Ecosystem

3. Interoperability and Management

Greenfield/Brownfield

Standardized on the OCP 19" server for scale-out

Different types of power sources needed for OCP hardware

Provider Ecosystem

Price transparency

Global consistency

Order quantity

Warranty terms

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Interoperability & Management

Heterogeneous management across legacy/new platforms
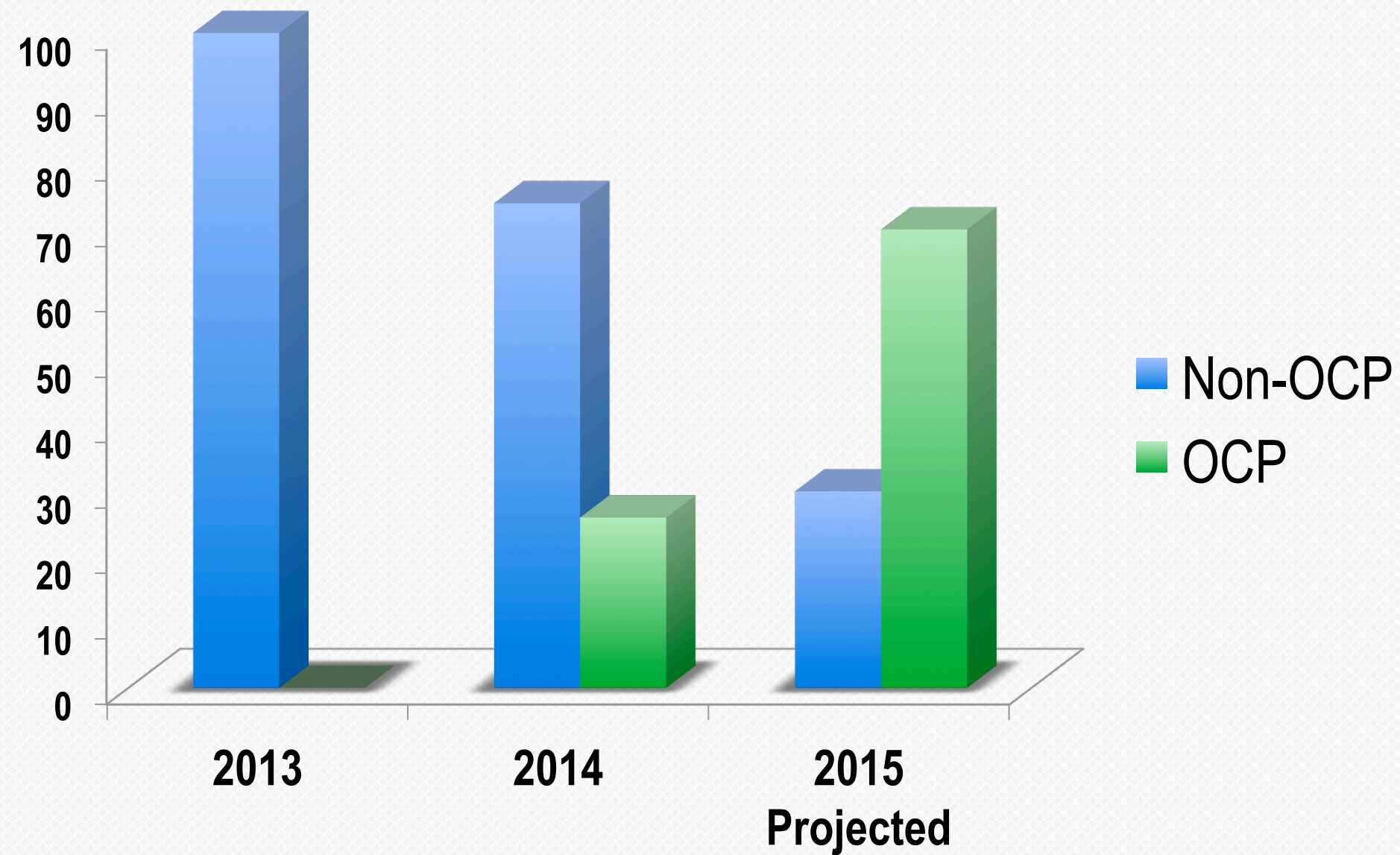
Build our software to understand OCP and OCP specs

Build tools that abstract differences between legacy vendors and OCP

Goldman Sachs

OCP

=

Enterprise

Realizing Benefits

Server Purchase Rate - % OCP Share

5% Power Efficiency

Looking Forward

Internal Focus

Globally available OCP certified servers

Ability to bid on servers in volumes of hundreds to thousands

Variety in CPU variants, drives and memory for same motherboard

Looking Forward

Working with the OCP Community

Longer-term, single-socket variants

Fit-for purpose warranty terms

Efficient supply chain

Hardware Monitoring Agent

Represents first IP contribution to community
Adheres to OCP hardware management spec

Features

Modular design, standardize on alert IDs

Allows engineers to take corrective action

Support for 19" Decathlete Hardware

IPMI Sel based alerts

OS – Syslog based alerts

Driving Open Compute Forward

Community

Contribute

Adopt