

# Blurred Lines, Disruptions and the Future of Real Estate

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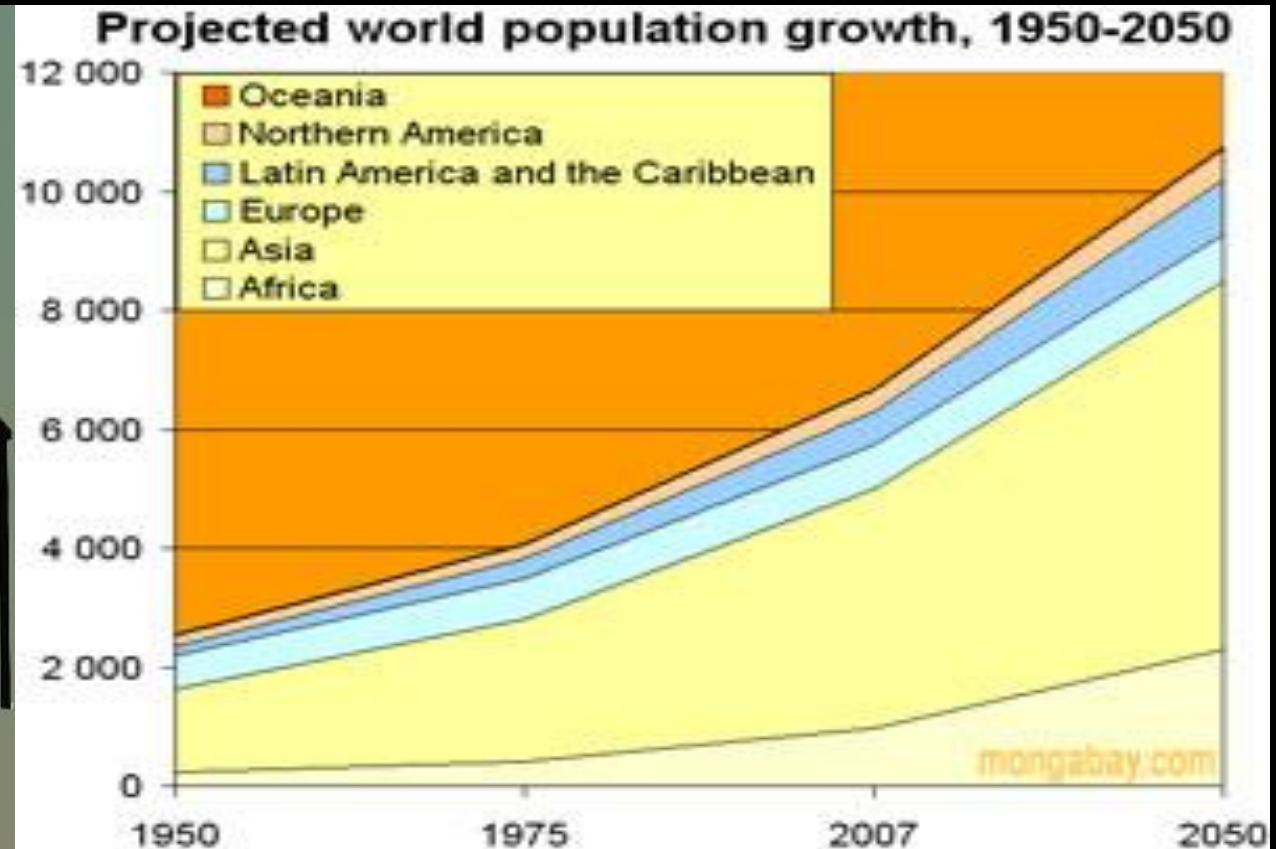
# Part 1: 10 Inevitable Trends

Welcome to the  
predictable  
future

# Part 1: Ten Inevitable Trends

## 1. Longer Life Spans and DNA Sequencing of Cancer Cells

US Men	76	US Women	81
Australia	80	Australia	84
New Zeal	80	New Zeal	83





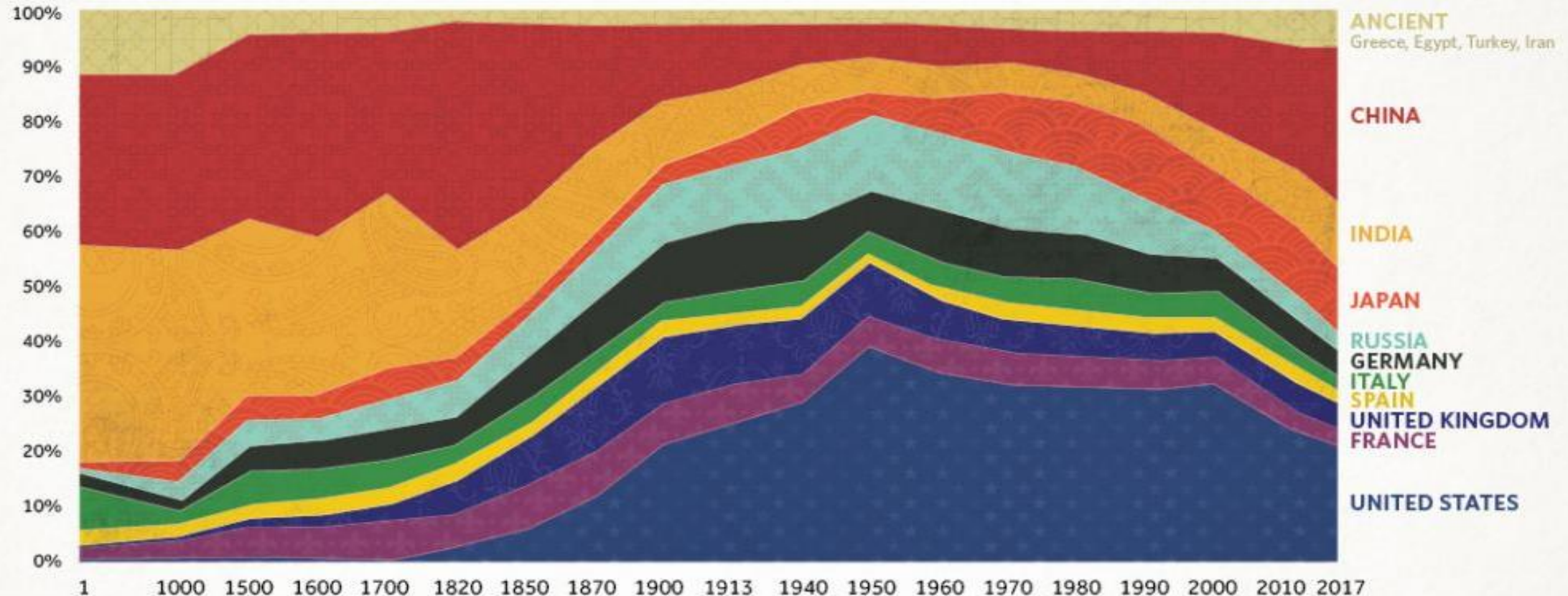
# Part 1: Inevitable Trends

## 2. The decline of US Global Economic power, China's RMB, not bitcoins, possibly replacing the US Dollar as a global trading currency

### 2,000 YEARS OF ECONOMIC HISTORY IN ONE CHART

All major powers compared by GDP from the year 1 AD

SHARE OF GDP (WORLD POWERS)





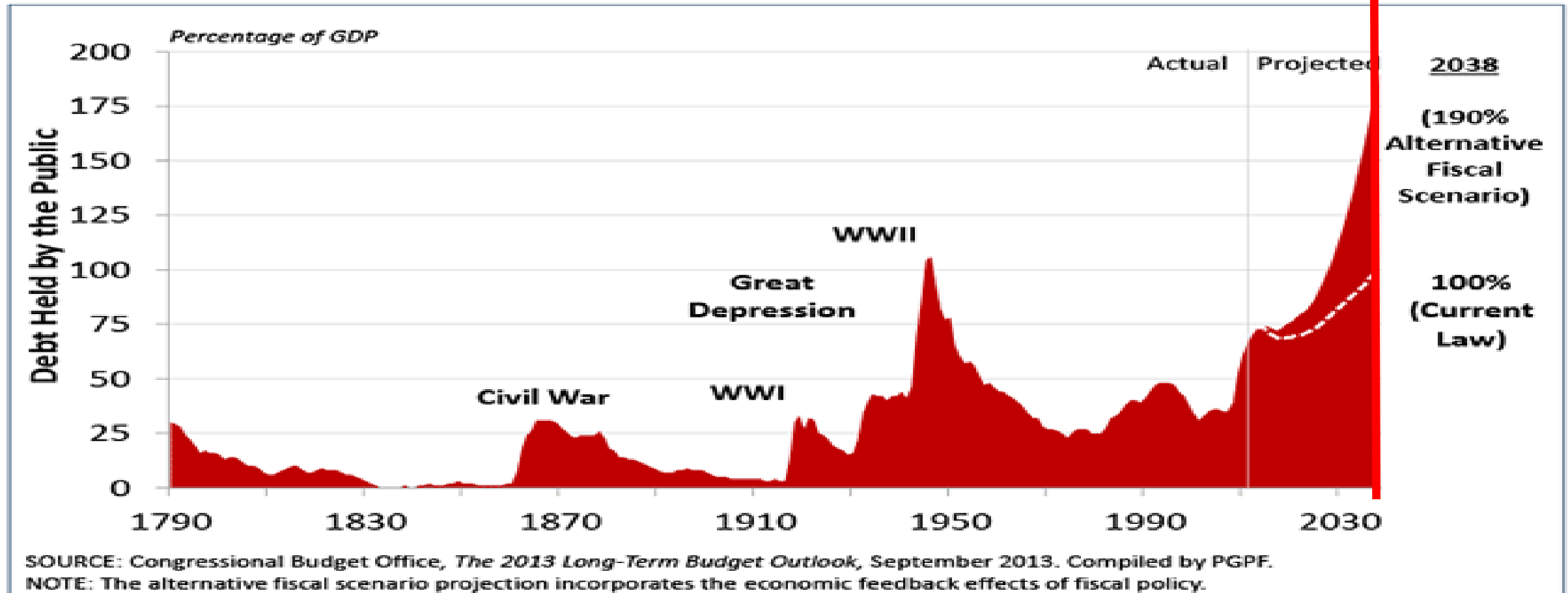
# Part 1: Inevitable Trends

## 3. US Fiscal Crisis and Political Pain

US Financial Crisis and  
Great Depression  
without political action



U.S. debt held by the public is on an u

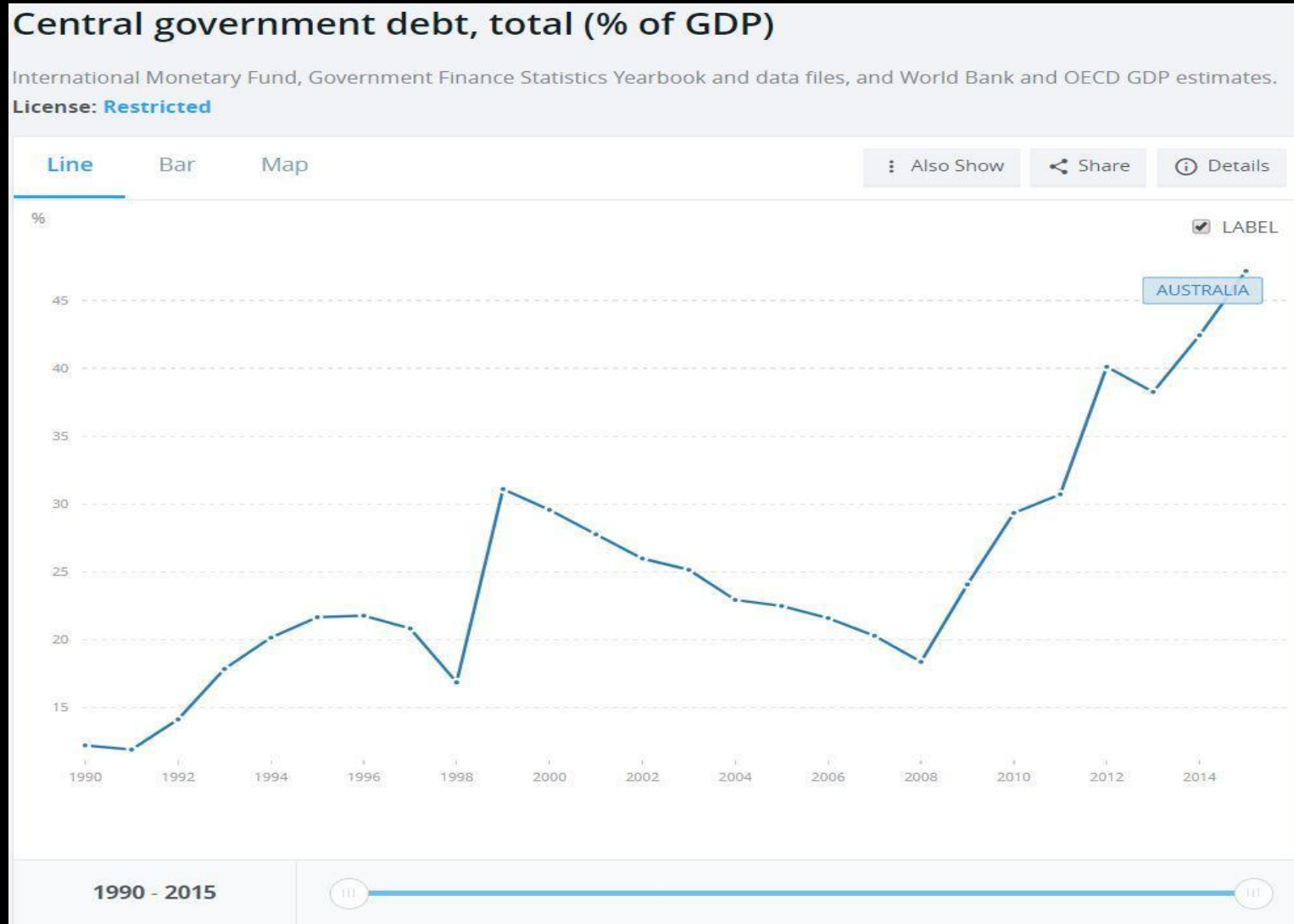


# Part 1: Inevitable Trends

## 3. US Fiscal Crisis and Political Pain

Current US Tax cuts are adding 1.5T to the deficit. Such deficits are like eating a jar of jalapeno peppers, what you do today may be a burning issues tomorrow!

# Australia is well behind the US but on a similar path, eating a few of those peppers





For Australia and New Zealand the relevant graph is more like this one and way sooner than 2030



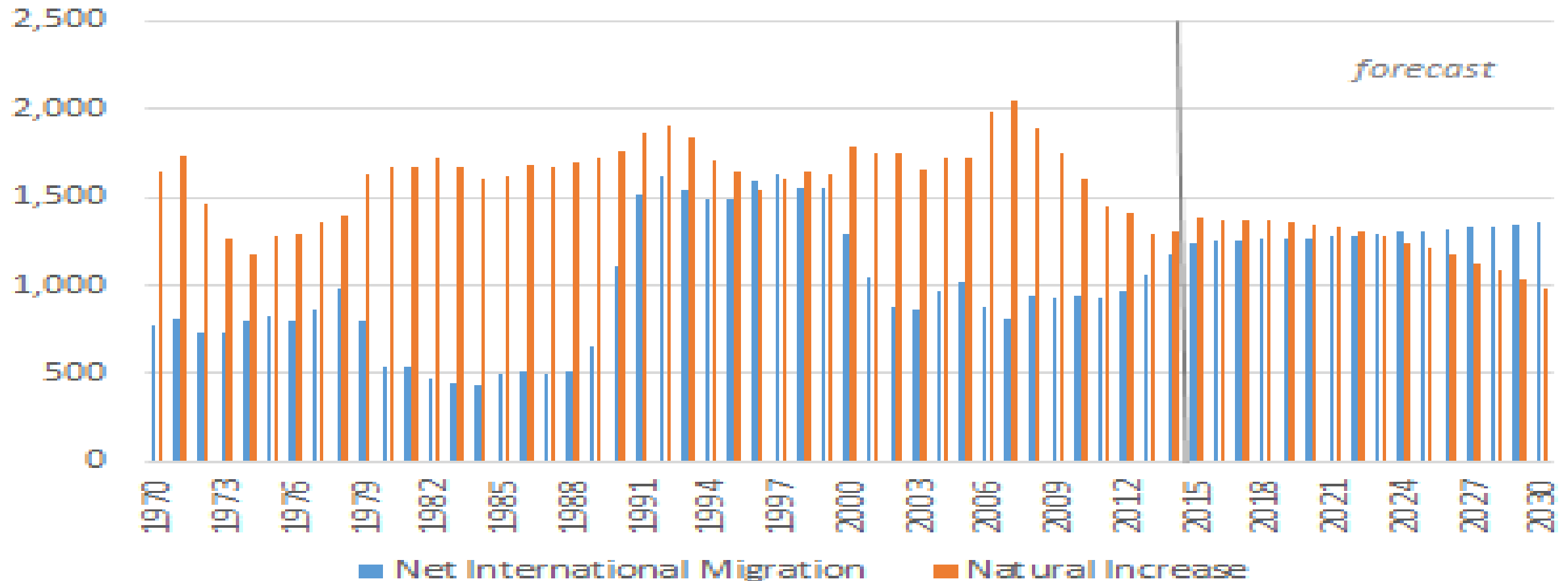
One factor leading to the US fiscal crisis is the stupidity behind immigration policies

# Adding to our economic woes: US Immigration decline

## Pre-Trump Exec Order Forecast below

US Natural Internal Population Increase vs Immigration (000's)

Source: US Census

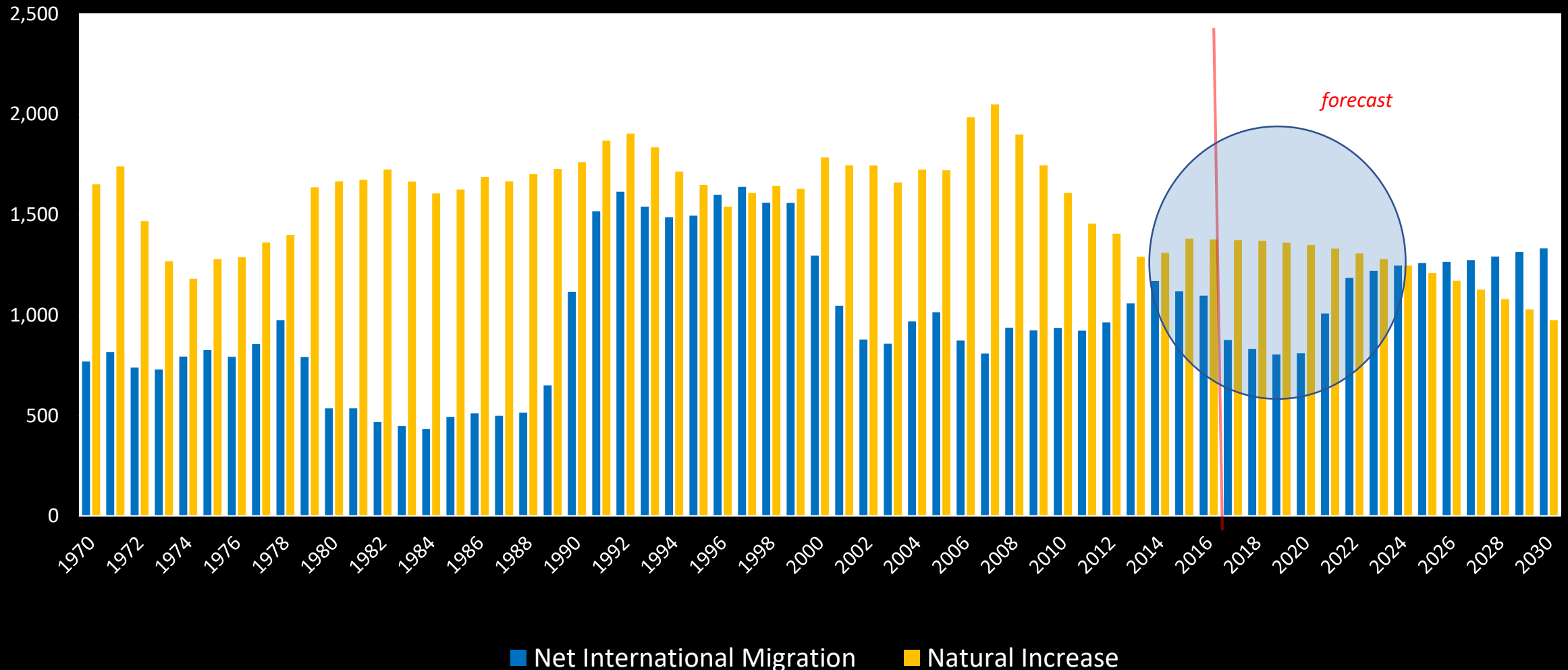




# Demographic Fundamentals: Slowing

Growth, More Dependent than ever on immigration  
AS modified by Moody's after Jan 25 of 2017

US Natural Internal Population Increase vs Immigration (000's)



Source: U.S. Census Bureau, Moody's, U.S. Dept. of Homeland Security, Hoyt Advisory Services

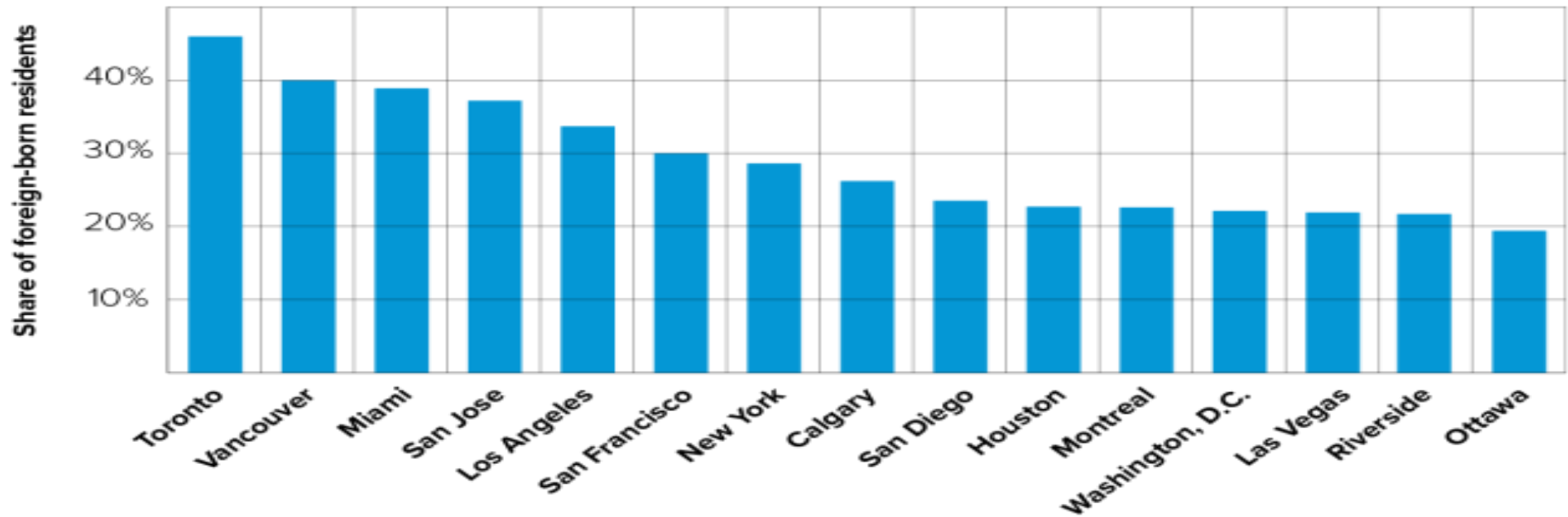
# Australia and New Zealand Populations

- Australia Birth Rate is 1.8 per family but population is still growing slower and slower. Immigration accounts for about 30% of the population growth.
- New Zealand Birth Rate is 1.9 per family but the population is older so there is no internal domestic growth. Immigration is critical accounting for 100% of the population growth.

# US Immigration's decline impact will be a lesson for others: US Losses are gains for Canada

- + Deeper depression sooner from lower social security pension contributions

**U.S. and Canadian Metros with Highest Shares of Foreign-Born Residents**



Source: U.S. Census American Community Survey 2015;  
Statistics Canada, 2011 National Household Survey



# Part 1: Inevitable Trends

## 4. Batteries, Energy Production + Lighter stronger composite materials , automation and technology

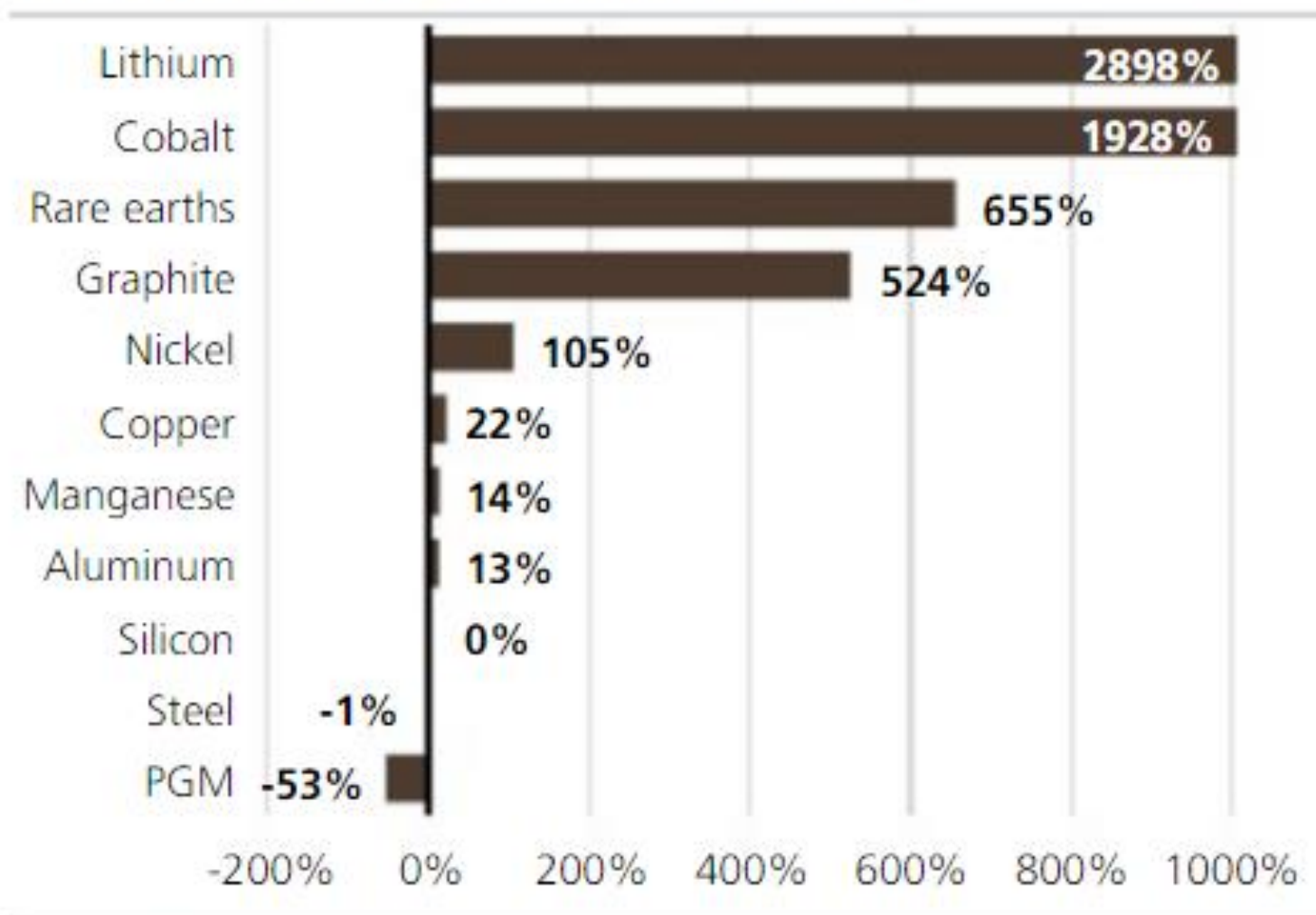


New Research Suggests Current Batteries Redesigned could hold 5 times the energy and be faster to recharge. New models will not degrade.

Source: Stanford University Dr. Yi Cui

Who is  
buying  
up all  
the  
mines?

Incremental commodity demand in a 100% EV world (% of today's global production)



Source: UBS estimates

# Dubai July of 2017 Launch: Drone taxis





## Uber's Plan to Launch Flying Cars in LA by 2020 Really Could Take Off



At 300 kilometers in range this could dominate especially with vertical take off ability



## Maiden Flight

The craft is powered by 36 separate jet engines mounted on its 10-meter long wings via 12 movable flaps. At take-off, the flaps are pointed downwards to provide vertical lift. And once airborne, the flaps gradually tilt into a horizontal position, providing forward thrust.



# Part 1: Inevitable Trends

## 5. Climate Change, global warming, increased weather, floods

Implications:

Positive for farmland in Canada  
and Russia

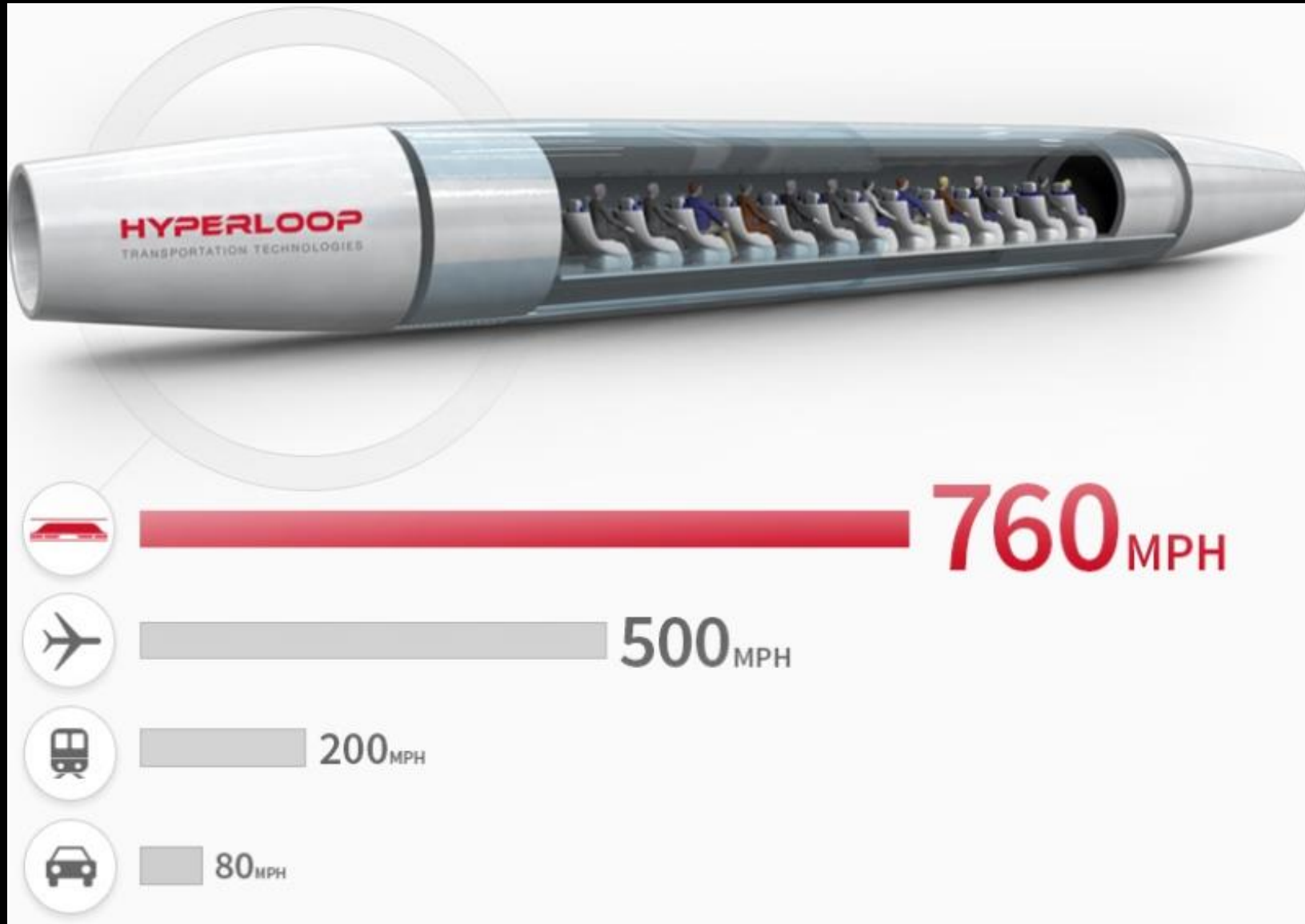
Floods and higher insurance  
costs

Less predictable weather



Texas Homes on August 28, 2017

Climate change  
makes this more  
attractive  
Hyper Loop:  
Miami to Orlando  
in 26 minutes  
versus 4 hours +



Climate Change may also spur more of this and less in-person meetings?



# Tech and 3D Printing equals a future of less standardized buildings

- Using structures that mimic the natural world of biology we should be able to build stronger much lighter buildings.
- 3D Printing can also be used for quick bespoke building part molds .
- Implications:
  - 1) Less waste,
  - 2) Thinner floors = more floors or higher ceilings that allow more natural light.
  - 3) Greater diversity of interesting designs, all customized.



# Using designs from nature



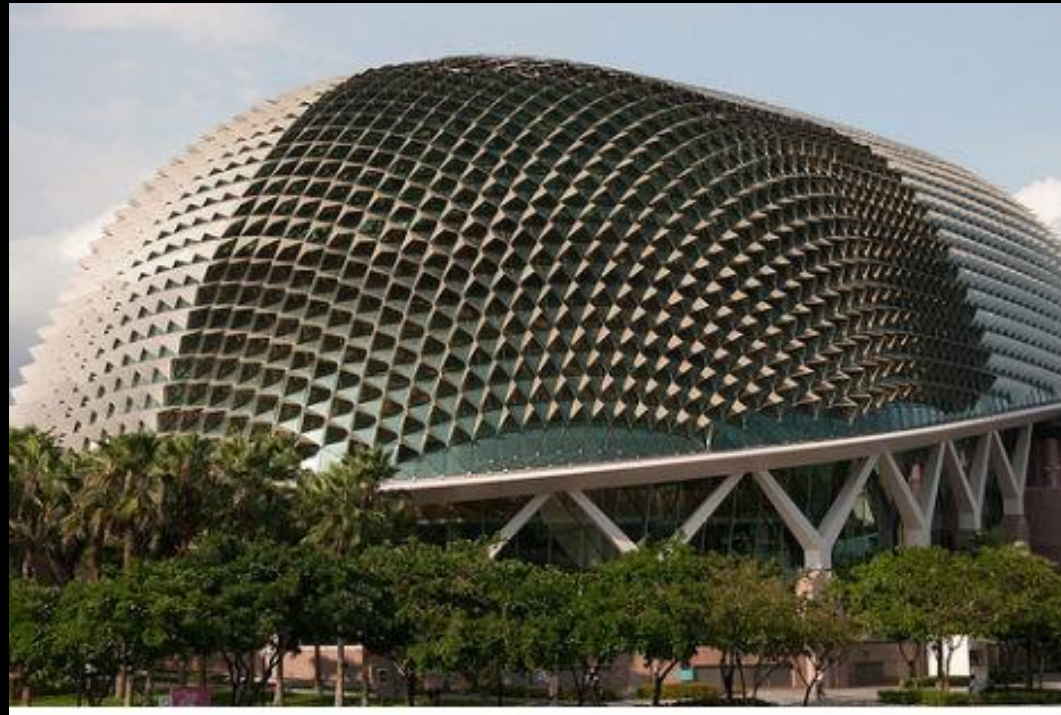




# How Biomimicry Enhances Creativity in Architecture



Bio-mimicry is  
extremely  
hard without  
3 D printing













# Zaha Hadid designs for Australia







# Part 1: Inevitable Trends

## 6. Autonomous Cars

Implications?

Disruptive and positive for  
all transit industries

Changes in building designs

Changes in parking costs

More urban street demand?





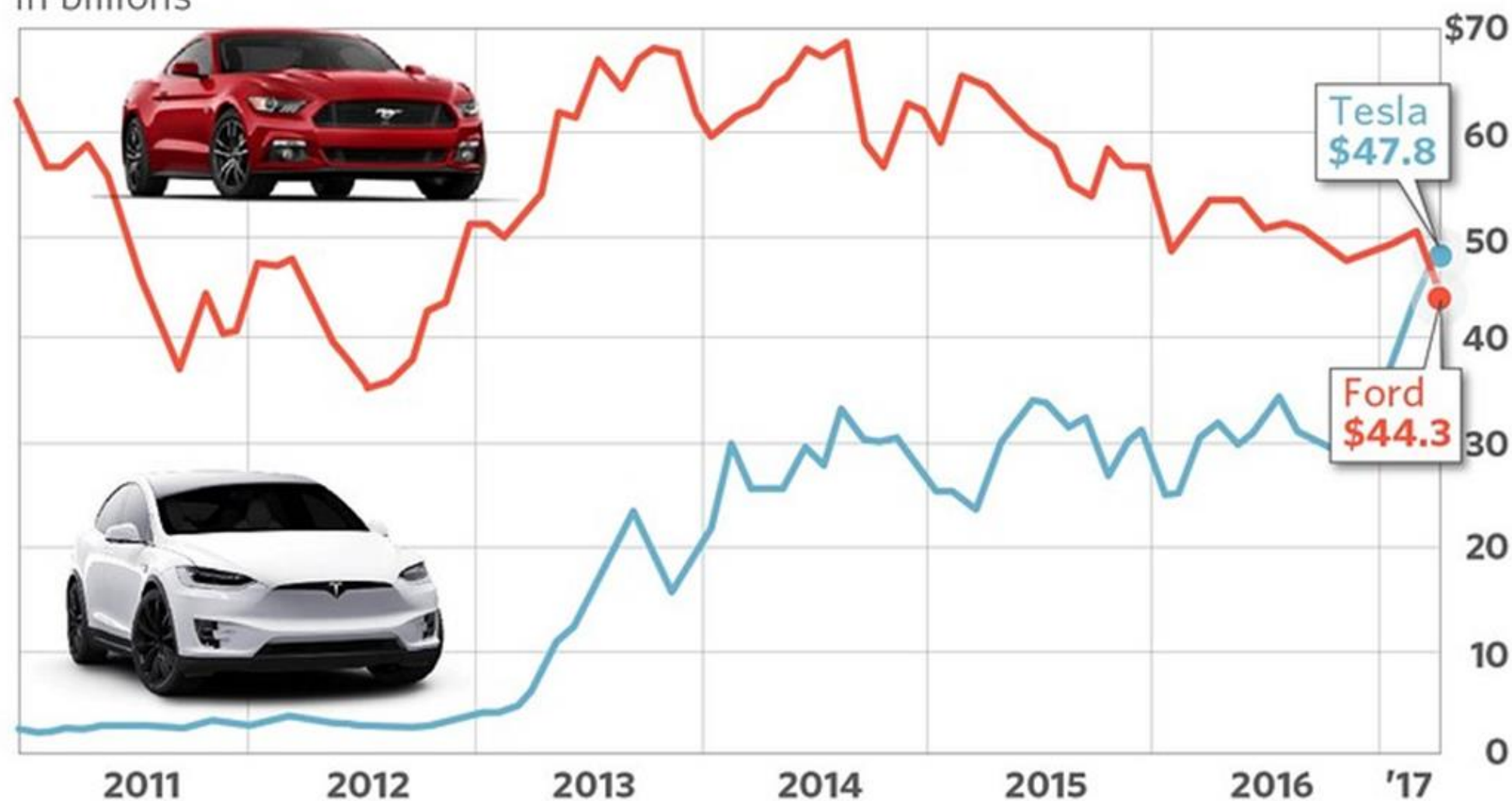
# Goldman Sachs: Self driving trucks will kill 300,000 jobs per year (Nov 15, 2017)



Employees stand next to self-driving, big-rig trucks during a demonstration at the Otto headquarters, in San Francisco. AP Photo/Tony Avelar

# Tesla's market cap overtakes Ford's

In billions



Source: FactSet



# Part 1: Inevitable Trends

## 7. Urban Factory

Farming and  
synthetic food  
production





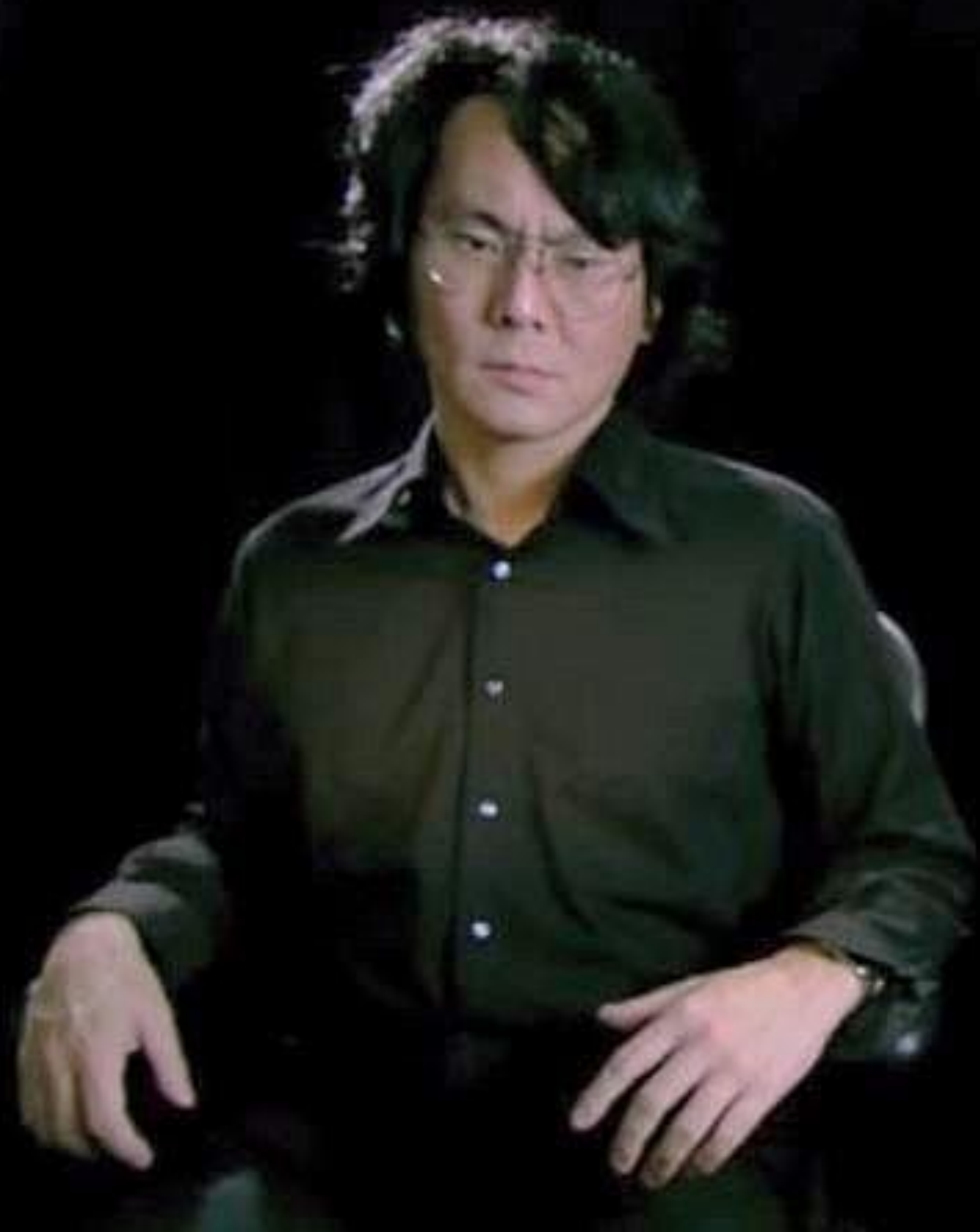
# Part 1: Inevitable Trends

## 8. Machines for Everything



Security Robots by Knightscope.com that augment sensing and can see through smoke and sense heat or metal or chemicals







This is a robot that can interact by voice

500 humanoid robot built from scratch in Hong Kong



Even close up she seems pretty real and has facial expressions.



# Getting more lifelike all the time





# Move patients or child care and monitoring



# Which jobs are most susceptible to automation, robots and machine learning?

- Bank Security
- Dishwasher?
- Court Clerk?
- Toll collector?
- Telemarketer?
- Data researcher?
- Teacher?
- Valet Parker?
- Surgeon?
- Professor?

# Who is safest?

- Jobs requiring manipulation and persuasion or negotiation.
- Jobs requiring creativity and innovation.
- Jobs requiring extreme hand dexterity

# Part 1: Inevitable Trends

## 9. Educating for Critical Thinking Versus Information

- Data capture and analytics will be a given
- Schools will need to adapt



# Part 1: Inevitable Tr

## 10. Virtual Reality





# Being There: Seeing There: Virtual Realities

[HOLO](#)[CREATE](#)[CAREERS](#)[ABOUT](#)

## Make virtual reality human

A truly immersive experience, volumetric VR teleports you to another place and gives you the freedom to move around human holograms as if you were in the same room, opening up worlds of possibilities.

**What will happen to our social skills when we can select virtual partners who behave exactly as we wish?  
Will simulated travel substitute for real travel for those with more modest means?**



## Part 2: Real Estate Implications of Inevitable Trends



## Part 2: We have had these traditional forms of real estate



Single  
Family

Office

Retail

Multi-  
family

Lodging

Industrial

# Single Family and New Tech Apps: Care to Share?





# WeWork's Multifamily Concept "WeLive" is Like a high end communal apartments

- Each unit has a bedroom, bathroom, basic kitchen but all other amenities like TV rooms, mailroom/bar, rooftop decks, game rooms, high end kitchen are shared.
- Units come furnished completely.
- As inventory grows you will be able to move from city to city with a membership.
- See <https://www.welive.com/>
- Implications?

# Single Family: More Modular and More 3D printed

- See Weberhaus for inspiration

## WeberHaus prefabricated homes

They're everything you imagine

WeberHaus makes building your dream home everything we believe it should be. From the first time you get in touch with our team to those first wonderful moments in your beautifully finished self-build home, the process will be a memorable and rewarding experience for you and your family.



to top

Day 1  
Site  
Prep,  
electric  
installing  
and  
damp  
proofing





# Crane and Trucks (Lorries) Arrive on Site





# Ground Flooring and Walls are Installed









Day 2: Stairs,  
more walls  
and interior  
components



Day 3: Roof and Interior Touch Up: Home is weather tight and finished in 3 days









Modern Multifamily: More amenities and more work spaces combined with hotel like services and shorter term leases or mobile memberships



# Office: Evolving rapidly but clashing with culture



Google Zurich



# Office Today: Collaboration and Connected





This is Office Space?



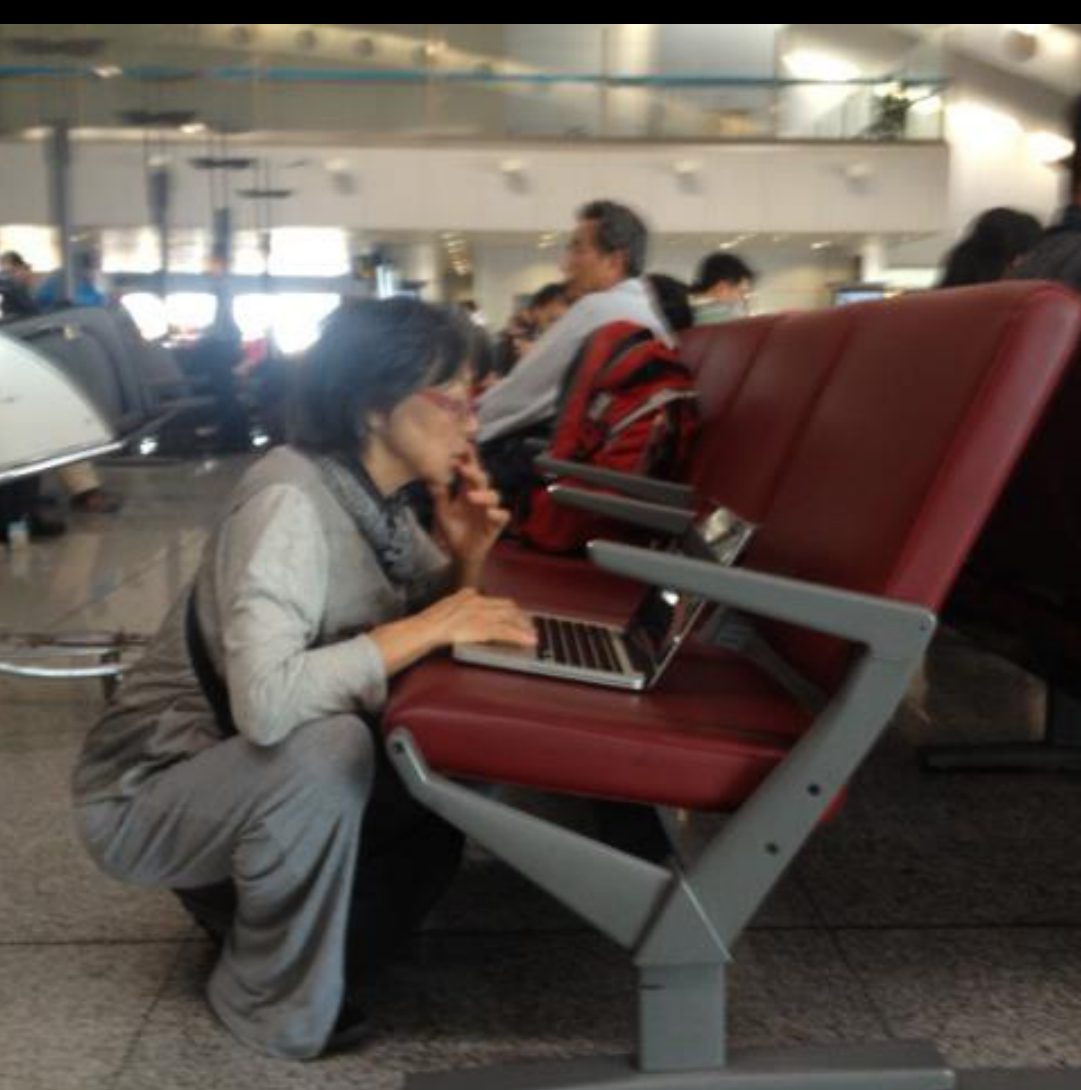


Hang outs with food, alcoholic beverages and more...to compete with home and third places





# Not to mention working anywhere...continues





1000 LAWYERS

150+ JURISDICTIONS

26 OFFICES

140 YEARS

## RECENT

10 Must Reads for the CRE Industry

New  
opportunities  
for branding  
and cross  
selling?



## OFFICE

## Verizon Dials into Co-Working to Make Use of Obsolete Space

In a pilot program anchored by co-working spaces, Verizon already has transformed four of its urban “telco” buildings.

John Egan | Jul 24, 2017

# Office Parking Garages Will Need to be Convertible:

This new Seattle building at Columbia & 4<sup>th</sup> by [LMN Architects](#) features car elevators and residential on the same floor with easy conversion. Floors are flat. There are no ramps.



# Shifting from parking on site to **drop offs** will require new access lanes.

See <http://www.designboom.com/design/audi-urban-future-initiative-11-20-2015/>



## ADVANCED ARRIVAL URBANIZING PARKING



### 1 DROP-OFF SERVICE

Instant access to urban life without any detours



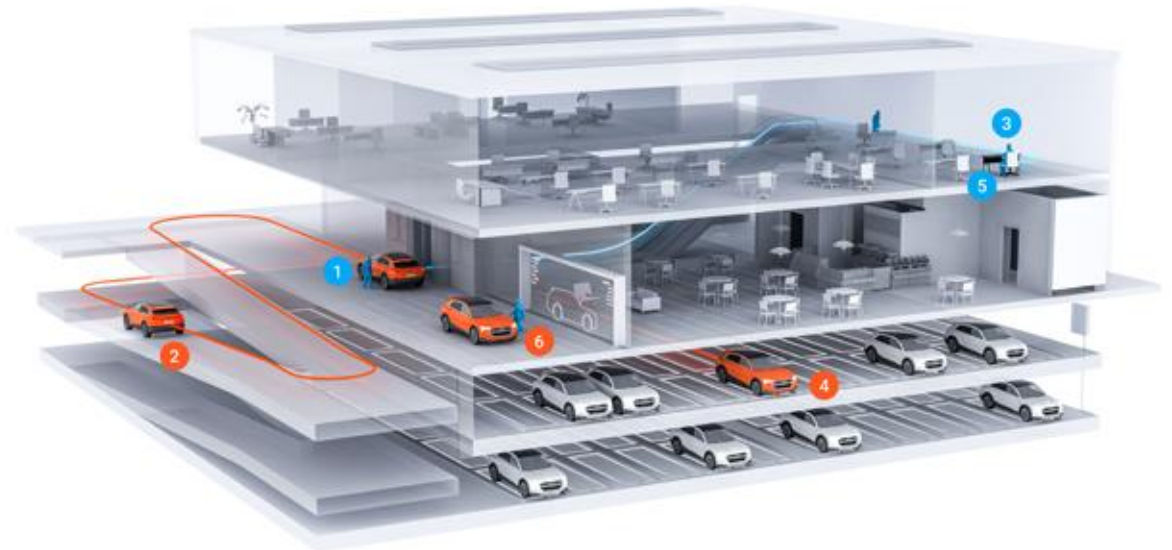
### 3 GAINING TIME

More time – less hassle circling. Piloted parking frees up valuable leisure time



### 5 CAR ON DEMAND

Providing individualized premium mobility via service app



### 2 CAR PARKS ITSELF

Efficient parking - Courtesy of piloted car technology



### 4 INDUCTIVE CHARGING

Charging the car while parking and always ready to go



### 6 PICK-UP SERVICE

Meet your car in a stress-free lounge atmosphere



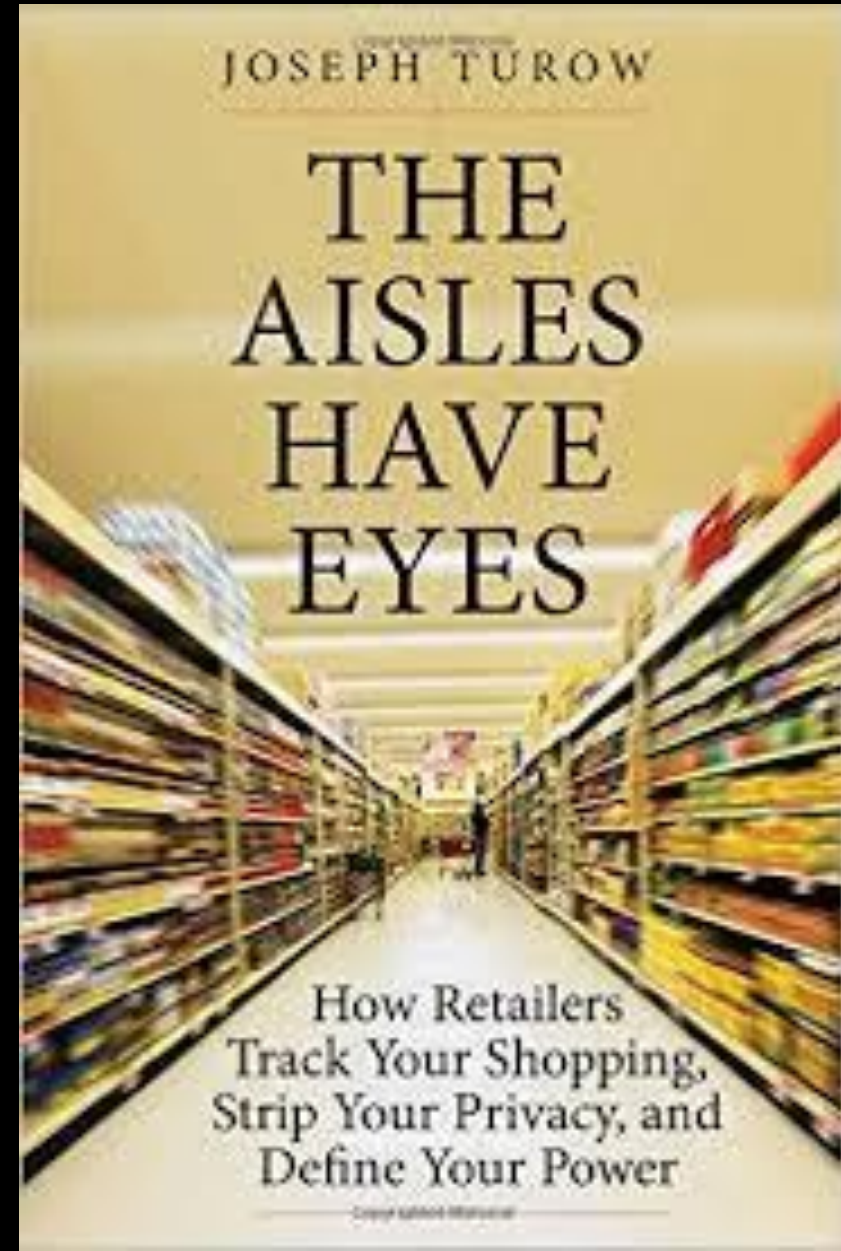


# Retail will be observational and interactive, (experiential)

Phone apps will guide me through store,  
show me sales

Grocers will teach cooking

Wine stores will have sommeliers giving tastings  
and advice



## 2017 the year that Retail Died... Or transformed?

in memoriam;

J.C. Penney: closing 138 stores

Sears Holding: closing 108 Kmart and 42 Sears stores

Macy's: closing 68 stores

RadioShack: closing 187 stores

Abercrombie & Fitch: closing 60 stores

Guess: closing 60 store

Gap: closing 175 stores

Wet Seal: closing 171 stores

Crocs: closing 160 stores

The Limited: closing 250 stores

American Apparel: closing 110 stores

BCBG: closing 120 stores

Payless ShoeSource: closing 400 to 500 stores

GameStop: closing 150+ stores

RadioShack: closing 552 stores by 2020

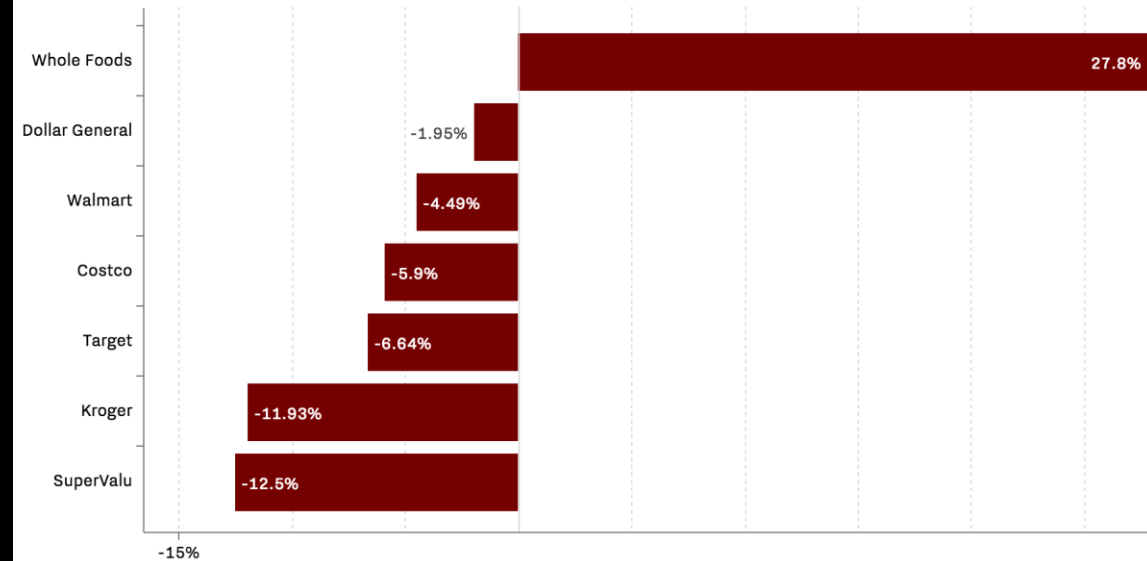
Staples: closing 70 stores

CVS: closing 70 stores

The Childrens Place: closing 300 stores by 2020



Grocery chain share price percentage change on Jun. 16



# Number of U.S. Store Closing Announcements By Retailer, First Half of 2017

Source: Fung Global Retail & Technology

2573 new store openings and 3296 store closings

High end and low end are missing from this list





# Amazon became more valuable than Walmart in 2015

\$500 billion market cap



Source: FactSet

recode

# One version of future retail



Shop in a Warehouse with a central retail display center at  
Apple  
and no  
checkout  
lines





Shop in a Subway and  
Have it Delivered within 2  
hours at home



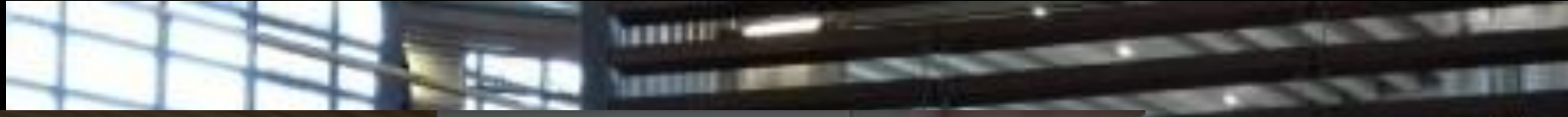
S. Korea

Or Shop in a Store with No  
Inventory by bar scanning

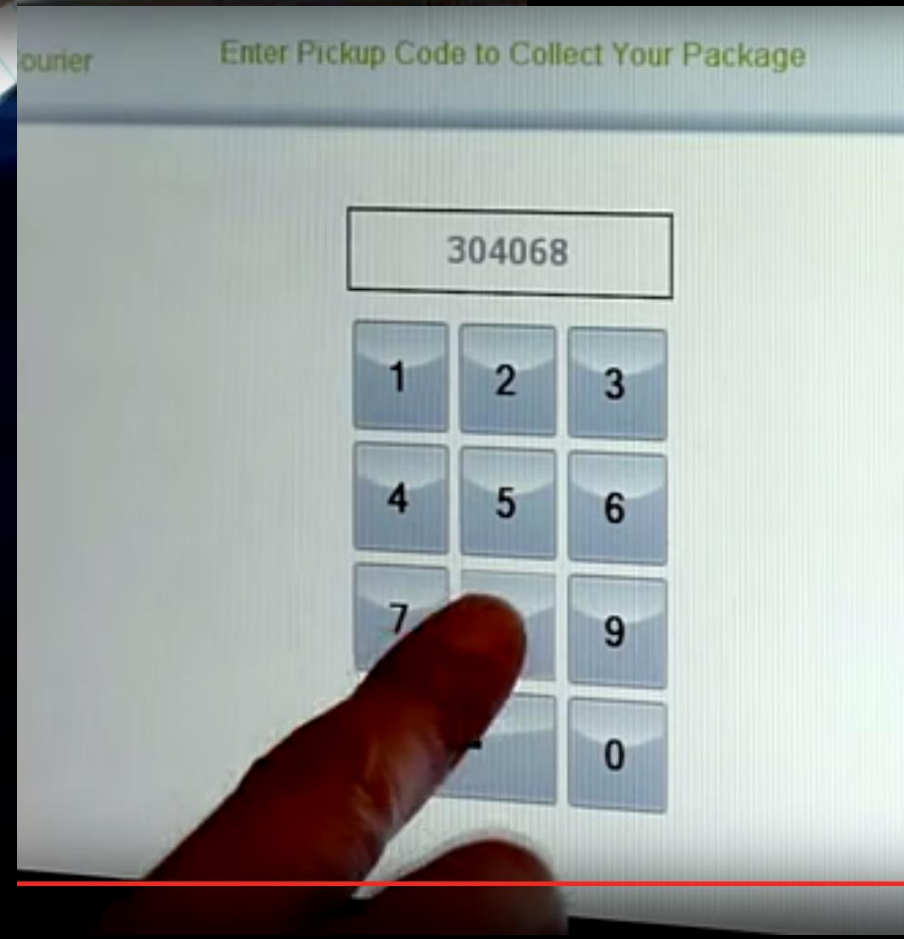




# Is anyone designing buildings or homes for easy delivery and storage of your groceries or dinner?



TZ Intelligent Package Lockers | Systec Smart Storage Lockers on GSA TXMAS Contract



(262) 968-9014

Some multifamily buildings and homes are catching on





# Hotels or Work Places Where You Sleep?





hotels

meeting rooms

groups

become a citizen

**citizenM says:** welcome to a new kind of hotel

[book a room](#)

everything you wanted  
to know about  
citizenM hotels



## SocietyM Meeting rooms

[book a meeting room](#)



It's time to put that Rotterdam mentality into practice. Big meetings rooms and big



If your ideal workspace looks like it should be featured in a magazine, feels as cosy as your





What is Hyatt Centric? >

Explore With Us

Locations

Special Offers

## MAKE A RESERVATION

Destination

City, attraction, address, or airport

Arrive

MMM/DD/YYYY

Depart

MMM/DD/YYYY

FIND HOTELS



WELCOME



ECLECTIC  
ACCOMMODATIONS



THE CORNER



LOCAL BAR &  
RESTAURANT



THE HEALTH  
STUDIO



CREATIVE EVENTS  
& MEETING SPACES

PRESS

CONTACT

BOOK A ROOM

VIDEO

GRADUATE ANN ARBOR

GRADUATE OXFORD

GRADUATE  
CHARLOTTESVILLE

GRADUATE TEMPE

GRADUATE MADISON

GRADUATE ATHENS

Graduate  
HOTELS

Social engineering or a hotel?

Next? The MIT Alumni Hotel? Or Crotchety Old Guys Hotel?  
Is this legal?

Hotel Cars: Autonomous Sleeper Cars ? Timed to deliver you just in time? Fewer airport hotels?





# Or Airports owning hotels???



## TRANSACTIONS

# Airline enters hotel business

BY ANDREA WAITROVICH

Allegiant Air has announced plans to build and own a beachfront resort in western Florida.



# Real Estate We Don't Need as Much of per Capita as before...

- Libraries, except as gathering places
- Gas Stations
- Banks
- Retail
- Office
- Home garages
- Traditional Schools
- Landfills
- Traditional farms
- Bus Stations
- In building parking
- ....

# Real Estate we will need more of....?

- 3D printing manufacturing centers
- Bio-tech, nano-tech, DNA sequencing analysis
- More remote parking stations for longer term vehicle parking
- Multi-transit nodes
- Urban farms
- Recharging stations
- Data centers, data centers, data centers...
- Senior housing of all types
- Virtual reality conference centers, gaming centers and exercise centers
- Other....?

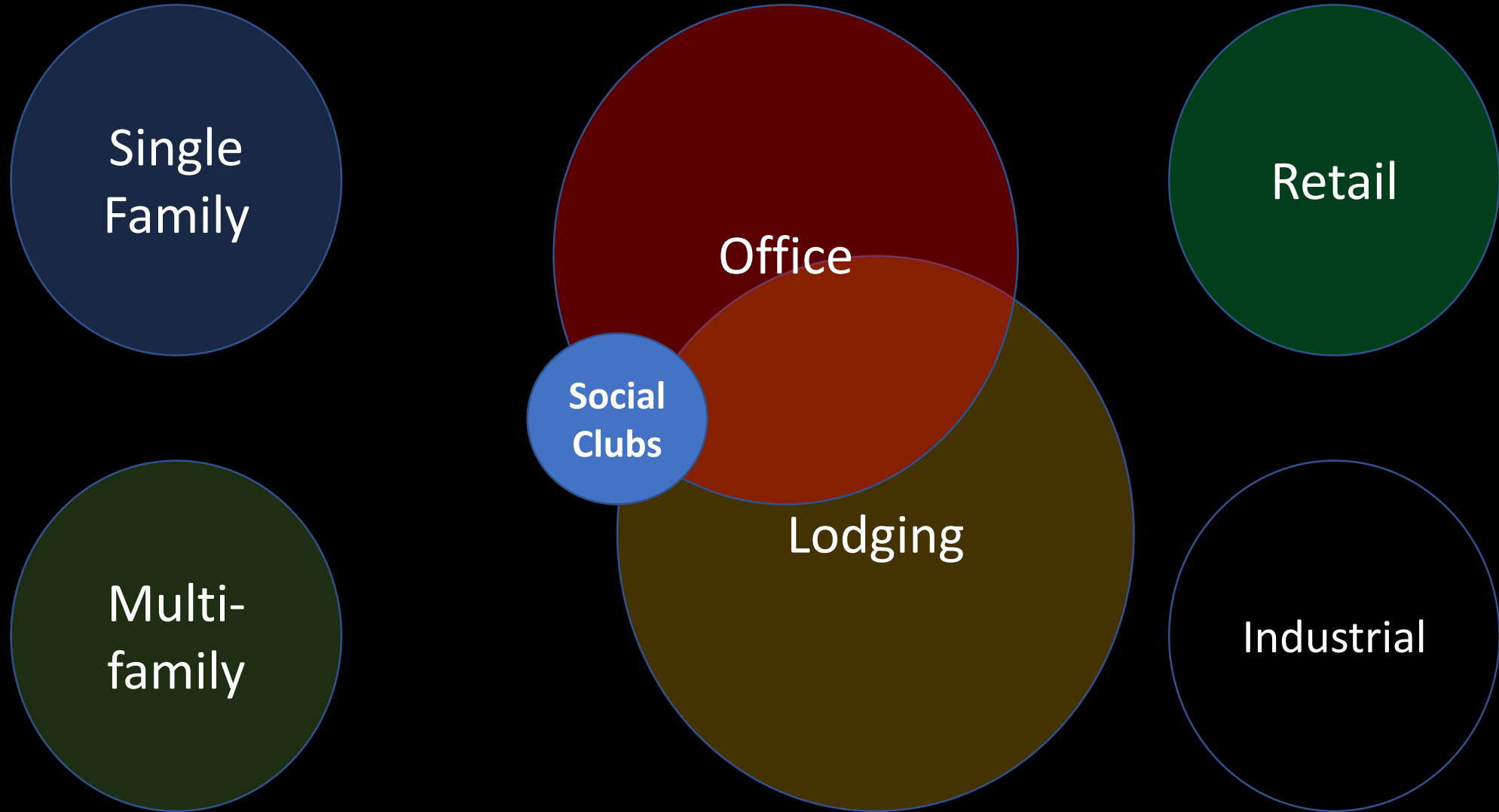


# Recall our Traditional Forms of Real Estate Prior to Transformation

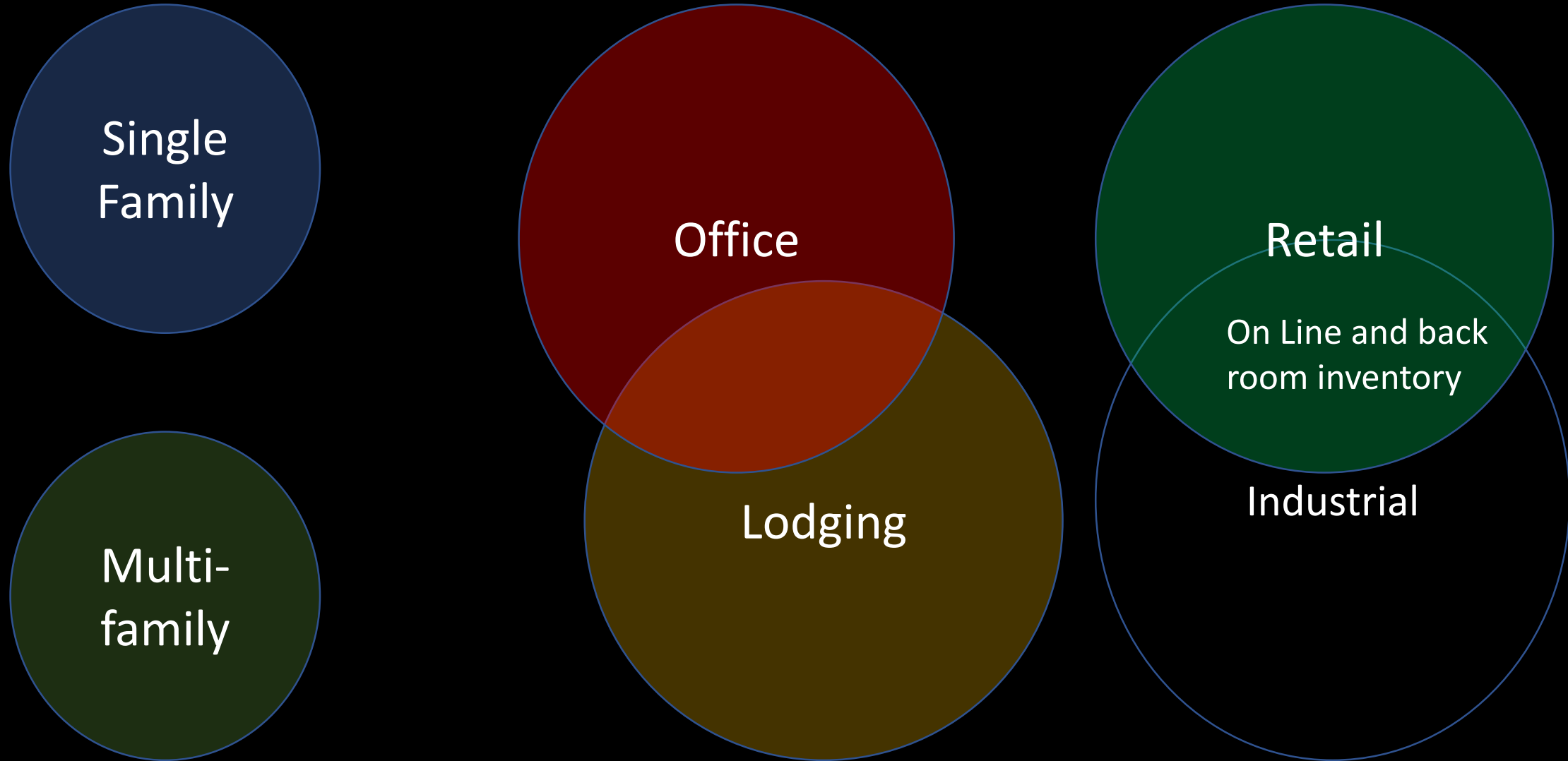


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# New Forms of Real Estate

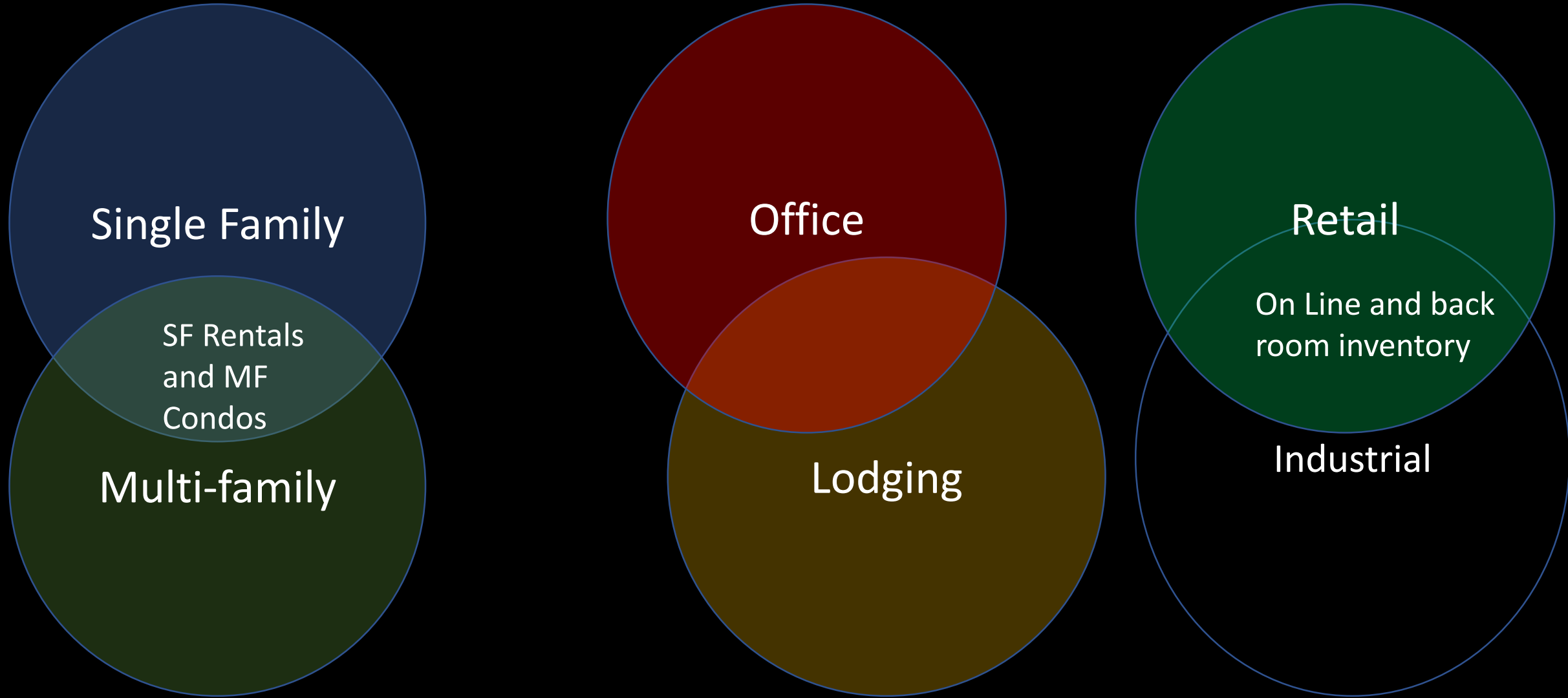


# New Forms of Real Estate

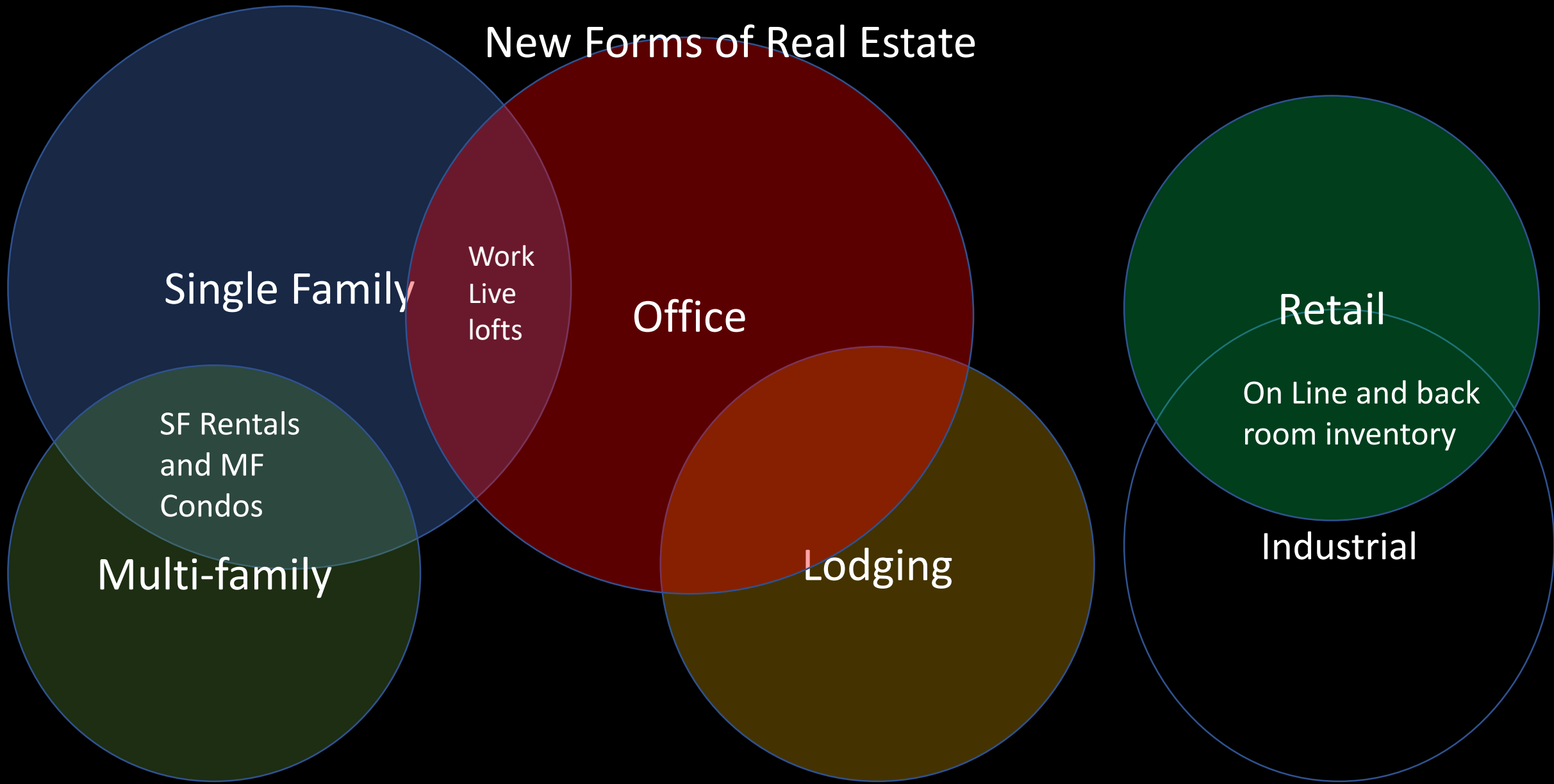


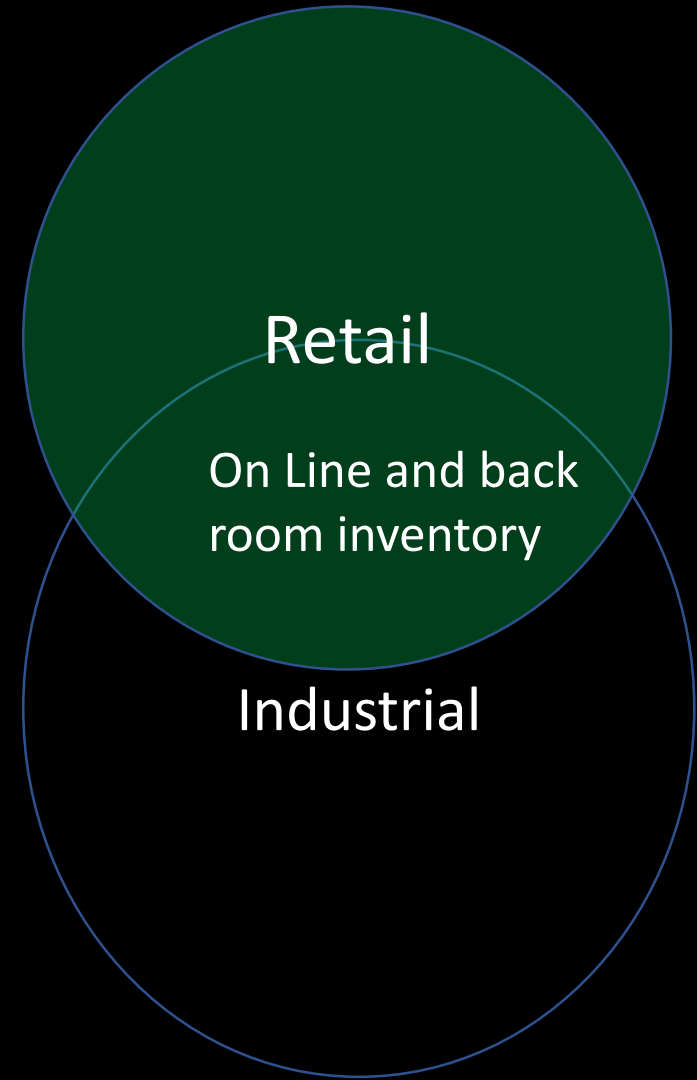
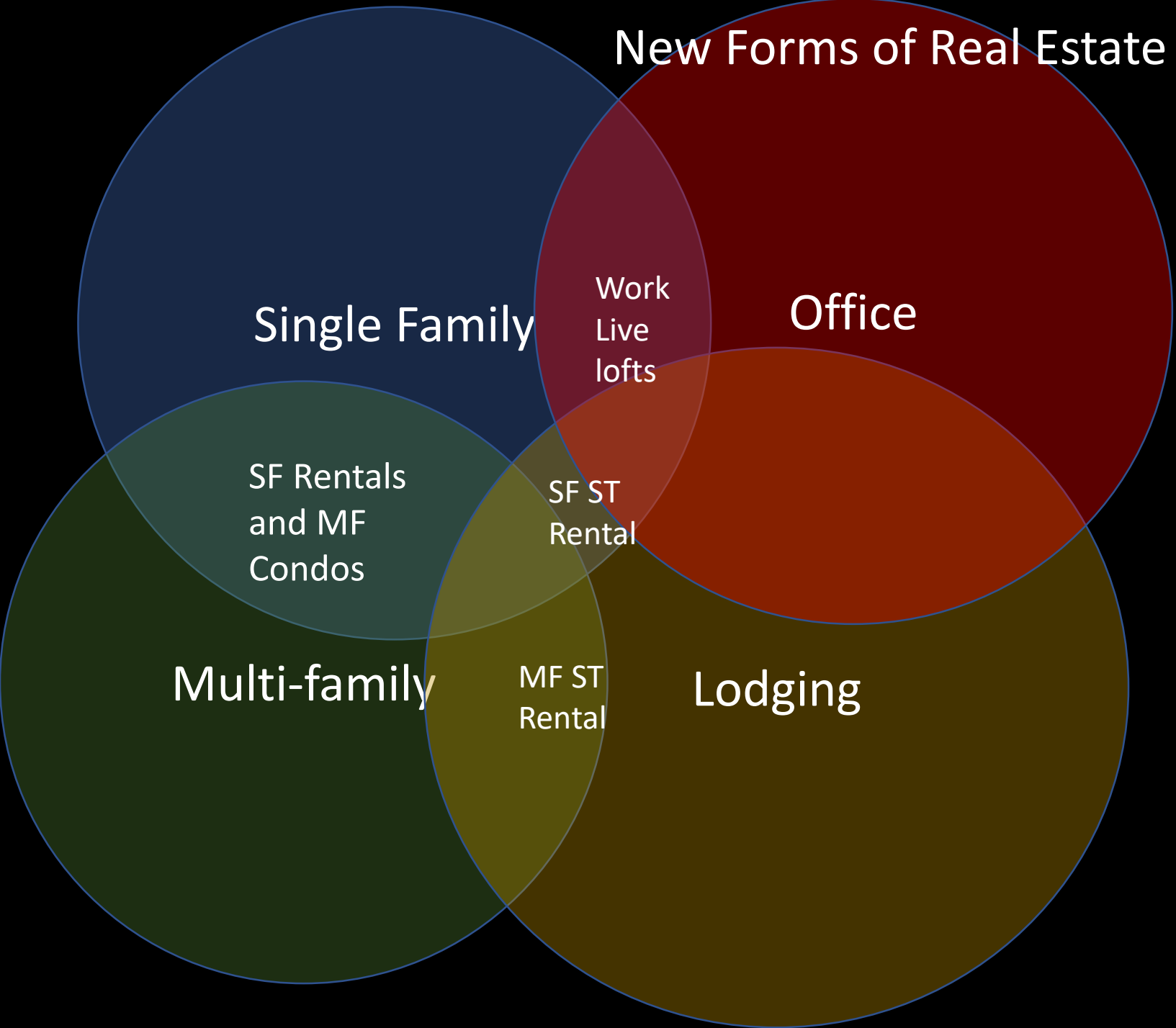


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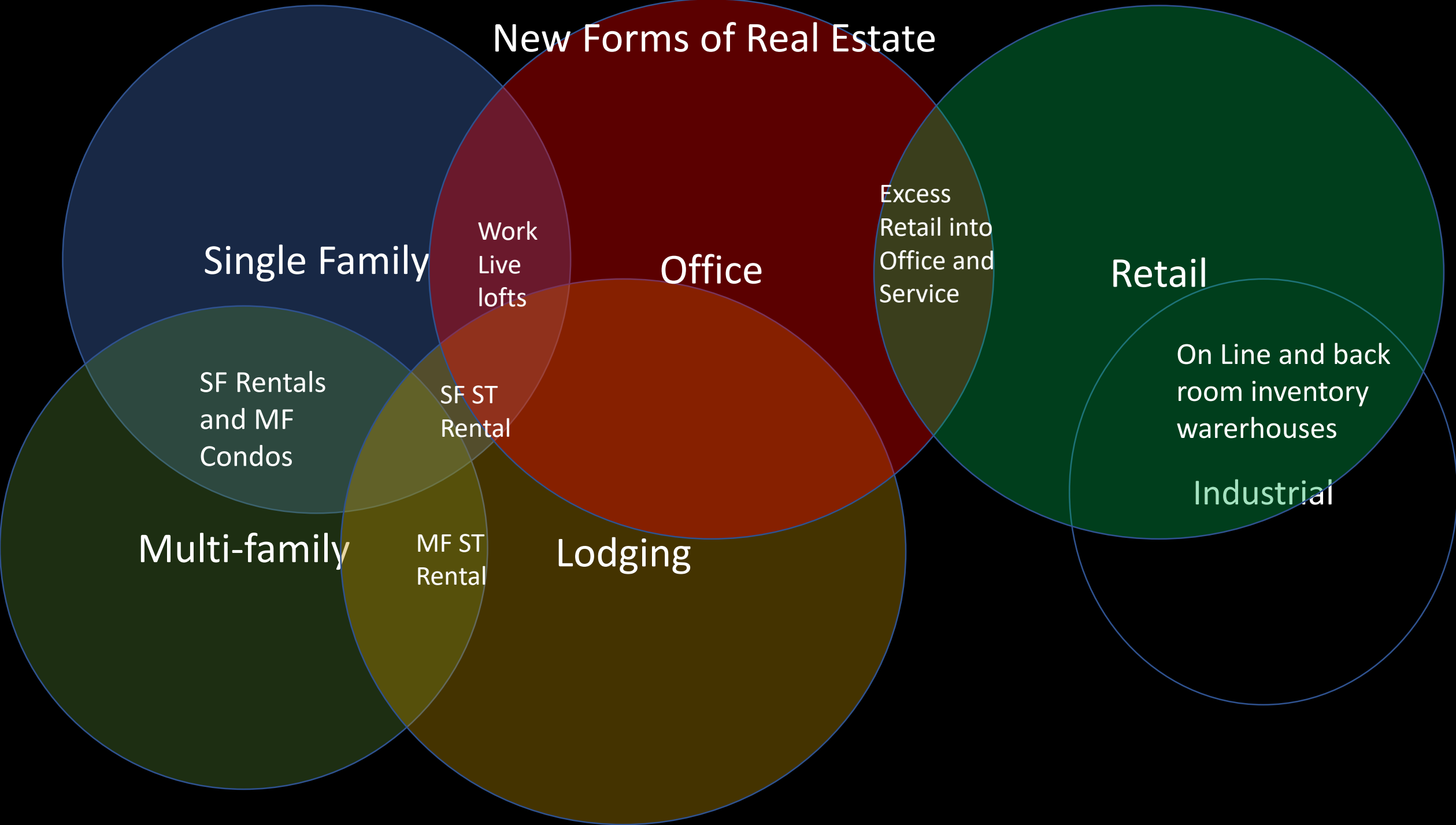


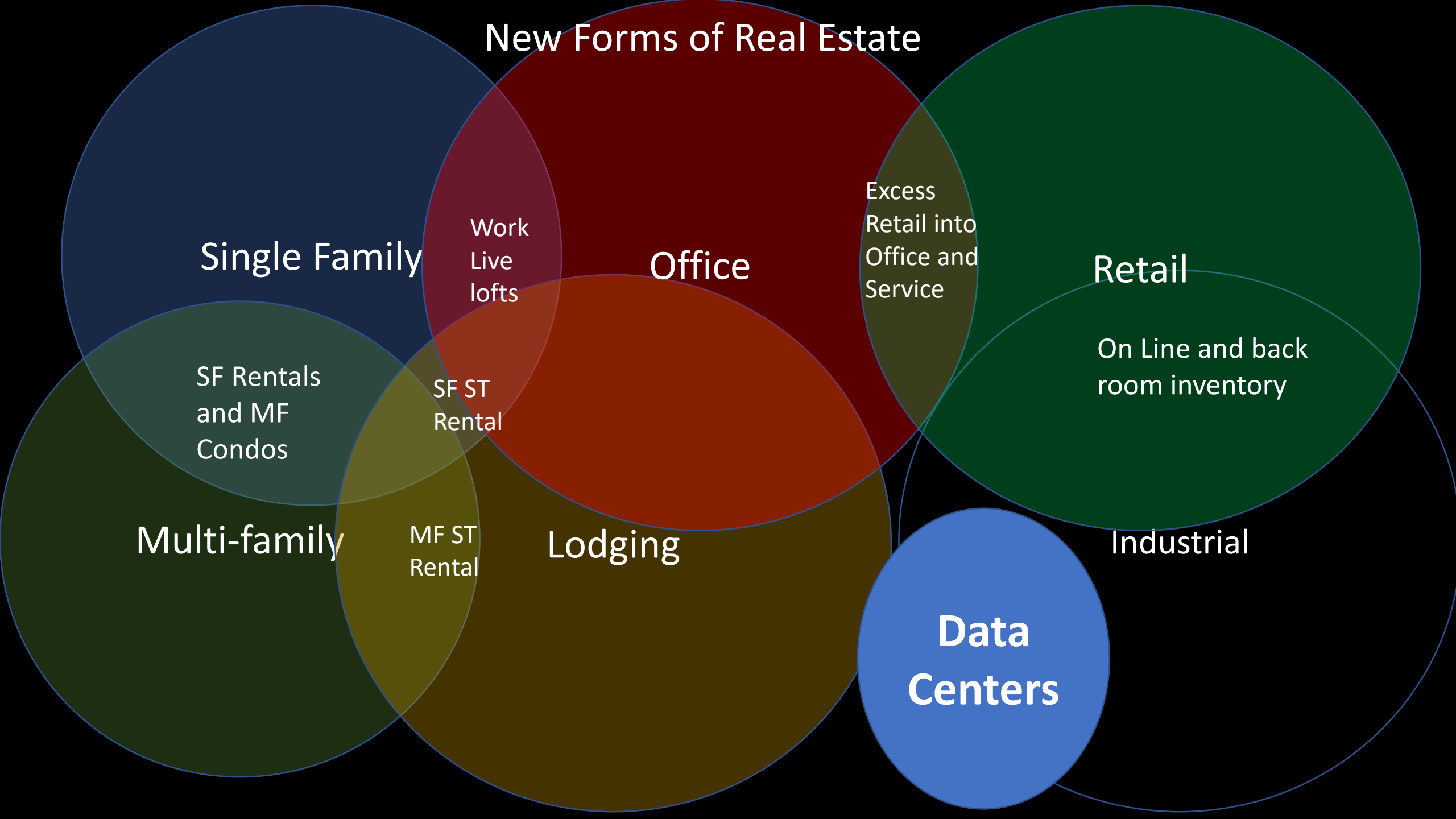
# New Forms of Real Estate

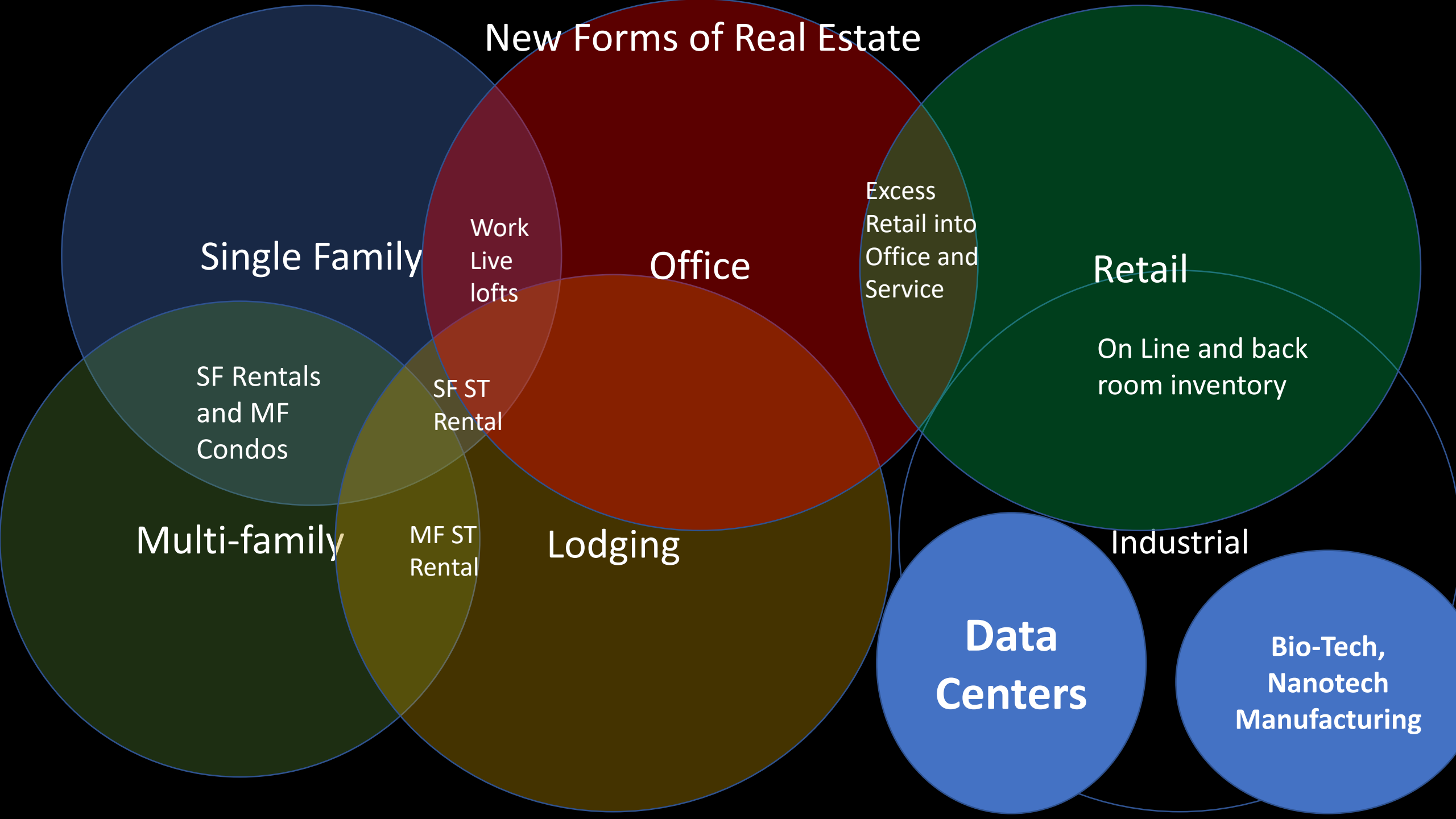














# New Forms of Real Estate



Single Family



Office



Self-Storage  
Climate  
Controlled

Excess  
Retail into  
Office and  
Service

Retail



Industrial



Data  
Centers

Bio-Tech,  
Nanotech  
Manufacturing

Work  
Live  
lofts

SF ST  
Rental

MF ST  
Rental



Lodging



SF Rentals  
and MF  
Condos

Multi-family





# New Forms of Real Estate



Single Family



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SF ST  
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Lodging



SF Rentals  
and MF  
Condos

Multi-family



# Conclusion One

- Real estate decisions are as critical as ever
  - TESLA's success will be as much a function of Supercharging location strategies as over coming battery and production issues.
- China's buying up Lithium and Cobalt mines might be as important to their economic success in the next decade as anything else they do.





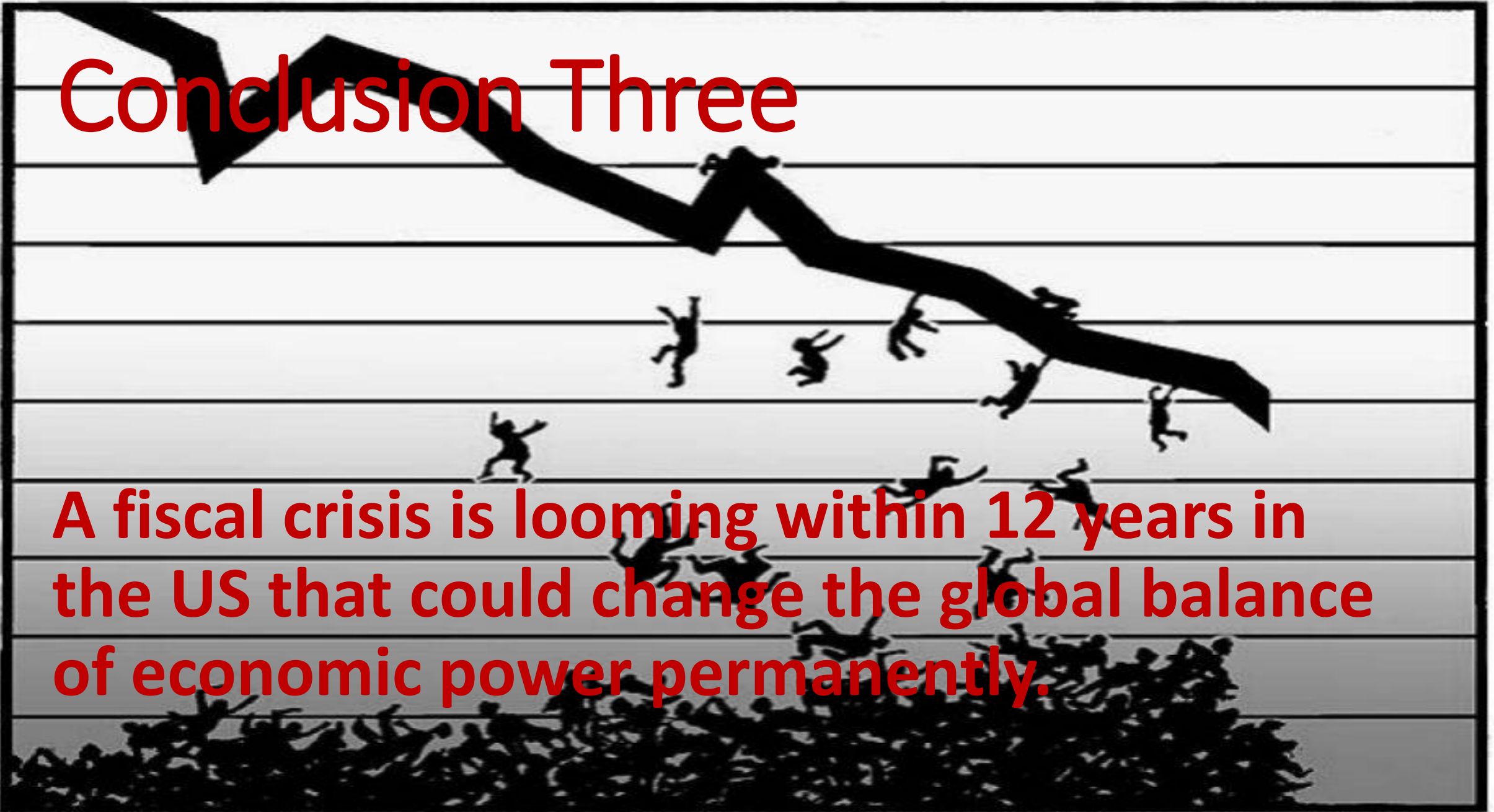
# Conclusion Two

**Science and innovation can save us from ourselves and resource limitations**



# Conclusion Three

A fiscal crisis is looming within 12 years in the US that could change the global balance of economic power permanently.



# Real Estate Conclusions

- 1. Homeownership and car ownership will become less important.**
- 2. Real estate offices, residential, hotels and warehousing are all morphing into new kinds of adaptable and over lapping uses.**
- 3. Many traditional uses of real estate will vanish.**
- 4. Retail is available everywhere and only luxury brands catering to those with lots of discretionary time or providing experiences will continue to sell by in person visits.**
- 5. Delivery systems will be automated like most transport.**



# Questions? Comments on... Blurred Lines, Disruptions and the Future of Real Estate

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# References and notes

# Longer Life Research and Precision Medicine

- Better medical treatments will start with DNA sequencing of diseases including cancer which will allow much more effective treatments with less guesswork and fewer side effects.
- Genome guided medicine will involve using the speed and scope of new sequencing technologies and data analysis for diagnosis: targeted (specific genes) or whole-genome sequencing would be used to characterize the individual patient's disease, and to determine potential treatment modalities based on these data.

See Mardis, Elaine R. *A decade's perspective on DNA sequencing technology*. 10 February 2011.

[http://molar.crb.ucp.pt/cursos/1%C2%BA%20e%202%C2%BA%20ciclos%20-%20lics%20e%20lics%20com%20mests/cbm/3%C2%BAANO/2%C2%BASEM/32-CBM-G/Sequencia%C3%A7%C3%A3o/workNGS\\_Mardis\\_Nature10.pdf](http://molar.crb.ucp.pt/cursos/1%C2%BA%20e%202%C2%BA%20ciclos%20-%20lics%20e%20lics%20com%20mests/cbm/3%C2%BAANO/2%C2%BASEM/32-CBM-G/Sequencia%C3%A7%C3%A3o/workNGS_Mardis_Nature10.pdf)

See Suzman, Richard. *Global Health and Aging*. 01 October 2011.

[http://www.who.int/ageing/publications/global\\_health.pdf](http://www.who.int/ageing/publications/global_health.pdf)

See Leon, David A. *Trends in European life expectancy: a salutary view*. 16 March 11.

<https://academic.oup.com/ije/article/40/2/271/735545/Trends-in-European-life-expectancy-a-salutary-view>

See Jameson, J. Larry. *Precision Medicine – Personalized, Problematic, and Promising*. 4 June 2015.

<http://blogs.lt.vt.edu/importedtastebuds/files/2015/10/Precision-medicine.pdf>



# Longer Life Trends

General improvements in the human condition will occur as starvation is removed as a cause of premature death. This occurs with better education and birth planning.

High fertility rate countries will see dramatic declines in birth rates.

Infectious and parasitic diseases will decline and death will come more from non-communicable diseases and chronic conditions.

Counter to the death from starvation trend, there will be greater death from obesity related illness.

Life expectancy is projected to increase in all 35 developed countries of the study below:

There is a 90% probability that life expectancy at birth among South Korean women in 2030 will be higher than 86.7 years.

See Kontis, Vasilis. *Future life expectancy in 35 industrialized countries: projections with a Bayesian model ensemble*. 7 April 2017.

<http://www.sciencedirect.com/science/article/pii/S0140673616323819>

# Fiscal Crisis by 2030

- One of the most convincing arguments that there will be a major depression coming from a kick the can down the road approach to entitlements and fiscal debt is discussed in a 2014 book entitled “Prosperity in the Age of Decline” by Alan Beaulieu, PhD

See <https://www.itreconomics.com/content/alan-beaulieu>

- A less pessimistic but still cautious view is presented by Mohamed El-Erian in “The Only Game in Town” 2016.
- From Congressional Budget Office: If current laws remained generally unchanged, federal debt held by the public would exceed 100 percent of GDP by 2039 and would be on an upward path relative to the size of the economy – a trend that could not be sustained indefinitely. See the Congressional Budget Office. 15 July 2014.
- <https://www.cbo.gov/publication/45471>

See also:

Cecchetti, Stephen G. *The Future of Public Debt: Prospects and Implications*. 2 February 2010.

<http://grahambishop.com/DocumentStore/5f6eb9ee-a179-4f7d-ad29-baafc53c6624.pdf>

Kogan, Richard. *Difference between economic growth rates and treasury interest rates significantly affects long-term budget outlook*.

<http://www.cbpp.org/sites/default/files/atoms/files/2-27-15bud.pdf>

# Batteries

- From “Potential of lithium-ion batteries in renewable energy” by Boucar Diouf \*, Ramchandra Poda \*\*,

\* Kyung Hee University, Department of Information Display, 26 Kyunghee-daero, Dongdaemun-gu, Seoul 130-701, South Korea

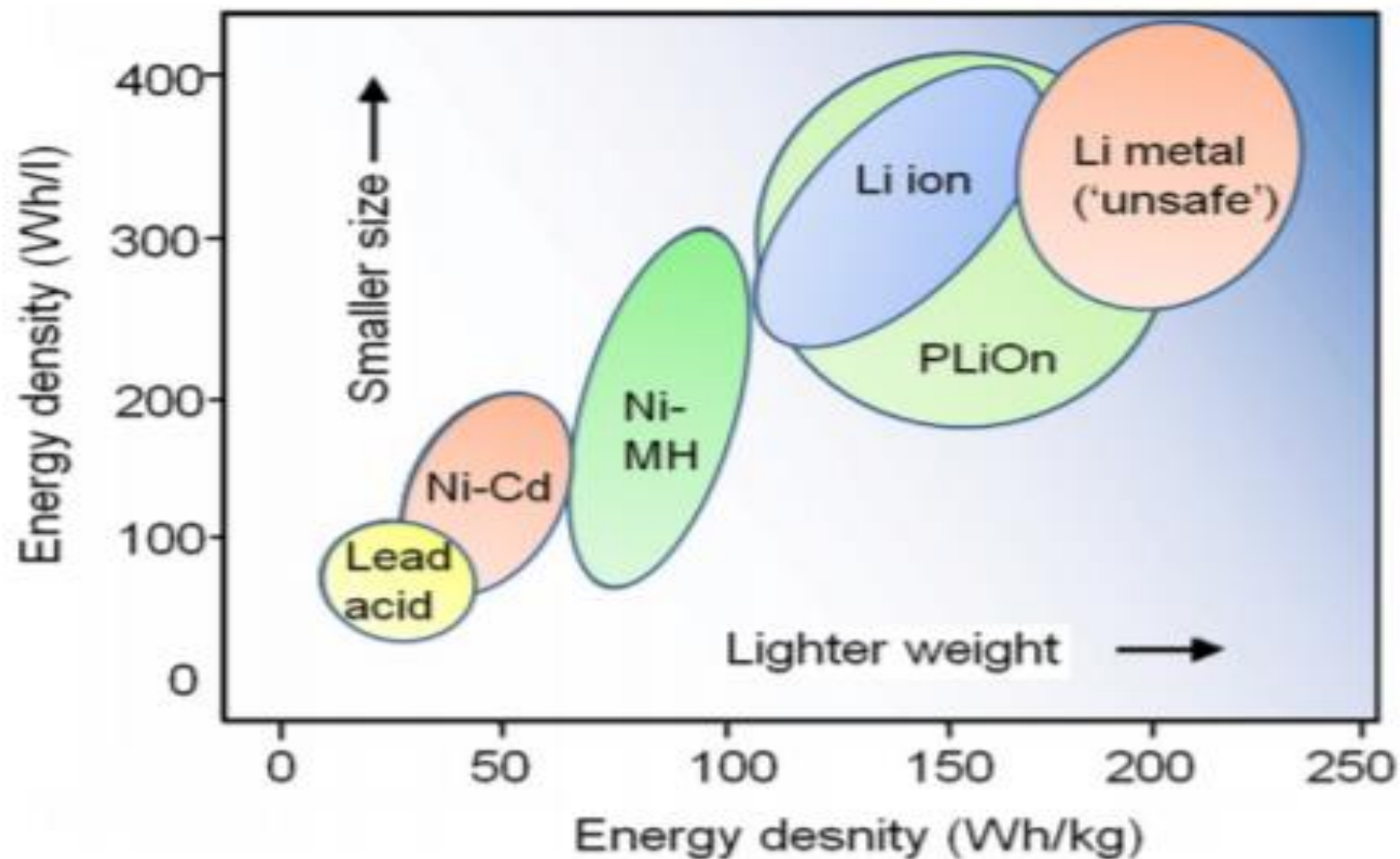
\*\* Kyung Hee University, Department of Physics, 26 Kyunghee-daero, Dongdaemun-gu, Seoul 130-701, South Korea

We get the chart on the next page that compares existing technologies.

Source:

<http://shop.tarjomeplus.com/Uploads/site-1/DownloadDoc/1019.pdf>





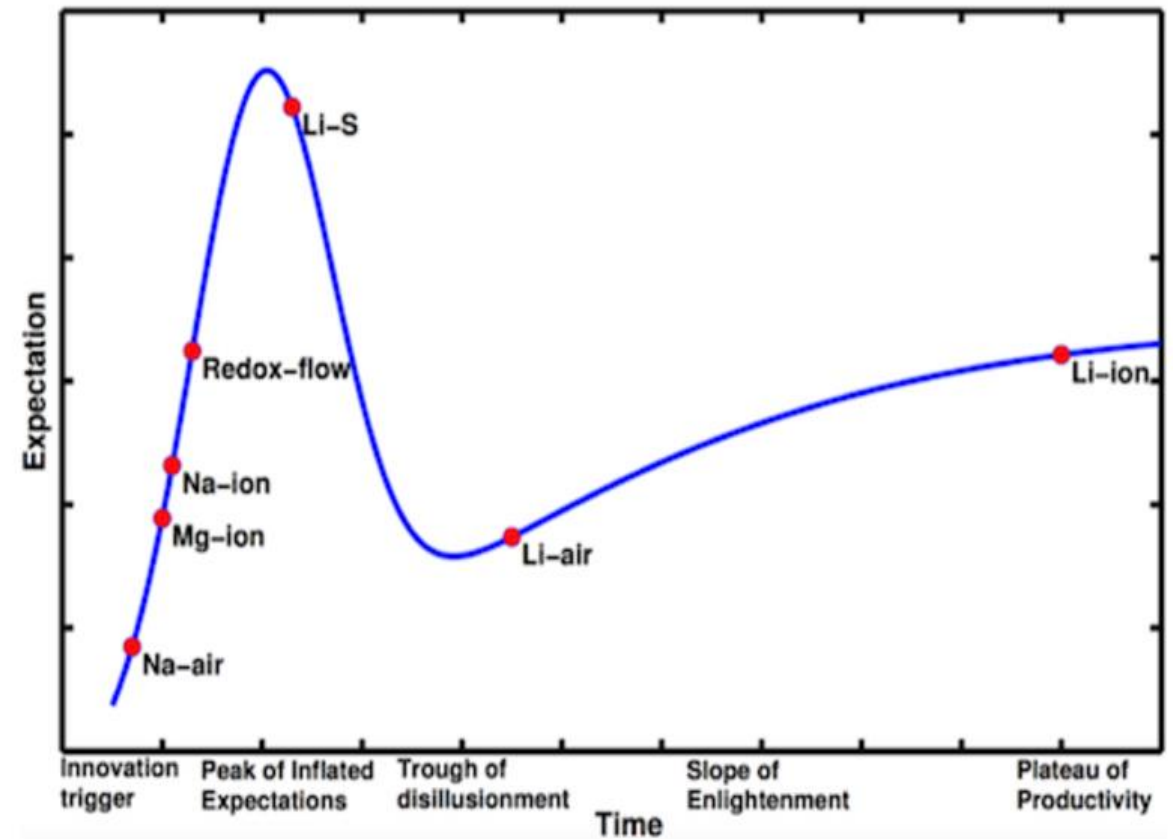
**Fig. 1.** Comparison between different battery technologies in term of volumetric and gravimetric energy densities.

From: "Beyond the Hype: What's the Future of Batteries?"  
In Scientific American

A "Hype Cycle" curve developed at Carnegie Mellon University shows us how far various technologies have to go before they can compete with lithium ion.

By [Robert Fares](#) on February 18, 2016

- The chart shows a few different classes of battery technologies. Magnesium-ion (Mg-ion), sodium-ion (Na-ion), and lithium-sulfur (Li-S) batteries all work kind of like Li-ion batteries do today, but they have the potential to beat Li-ion when it comes to energy density (i.e. how small/light the battery is) and cost. In particular, Li-S batteries have the potential to be drastically cheaper than conventional Li-ion batteries due to the low cost of sulfur. However, present Li-S batteries suffer from instabilities that cause a huge drop in efficiency and increased self discharge. Furthermore, Li-S battery electrodes can swell by as much as percent as ions are shuttled around within the cell, so it's difficult to design materials that can hold the battery together. Nevertheless, Li-S batteries are one of the most promising technologies for the future, having just traversed the "peak of inflated expectations" identified by Viswanathan and his students.



The only battery chemistry besides Li-ion to overcome the "enlightenment" is lithium-air (Li-air). Li-air has enormous potential. It uses a different technique to store energy. The battery cell uses metallic lithium in its negative side and reacts with atmospheric oxygen on its positive side. Because one of the reactants in the battery is air, in theory you need half as much battery materials to store the same amount of energy, and the weight of the battery can be reduced by half. This is especially appealing for electric vehicles, which would benefit greatly from smaller battery packs. However, Li-air batteries still have a long way to go before they can achieve the cost and lifetime of conventional Li-ion batteries and reach the "plateau of productivity."

# Automation and Jobs at Risk: 2013

WORKING PAPER



## The Future of Employment

Carl Benedikt Frey & Michael Osborne



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“Three-dimensional printing (3DP) represents a relative novel technology in manufacturing which is associated with potentially strong stimuli for sustainable development.”

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# Autonomous Cars and Tunnels

- Safety is the most important constraint on autonomous car rollout.
- From TechWorld “11 companies working on driverless cars: Volvo, Google, Tesla and more are investing in autonomous vehicles”
- See <http://www.techworld.com/picture-gallery/big-data/-companies-working-on-driverless-cars-3641537/>
- See also Jo, Kichun. *Development of Autonomous Car – Part I: Distributed System Architecture and Development Process*. 01 December 2014.

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# Urban Farms and Synthetic Food Production

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# Tech investors bet on synthetic biology

*Once hesitant, Silicon Valley venture capitalists are warming to the idea of engineered cells.*

BY ERIKA CHECK HAYDEN

In 2012, Emily Leproust was trying to raise money to start Twist Bioscience, a company that aimed to synthesize DNA more quickly and more cheaply than existing methods allowed. But many investors were spooked by the perception that synthetic biology — the engineering of microorganisms to make useful products such as drugs, food ingredients and materials — would not turn a profit. “It was a lonely time,” Leproust recalls.

Three years later, Silicon Valley’s big fish — technology investors with billions of dollars at their disposal — have finally ventured into synthetic biology’s small pond. Scared away from conventional biotechnology in past by the risky and expensive prospect of drug development, they are now lured by what they see as synthetic biology’s huge market potential, plummeting operating costs, improved business models and an increasing emphasis on computing.

“The toolkit is evolved from where it was two years ago: synthetic biology is going through a

## MONEY FOR MICROBES

Investments in synthetic-biology start-ups have increased dramatically in the past three years. Much of the funding comes from prominent technology investors.

COMPANY	YEAR FOUNDED	BUSINESS	TOTAL FUNDS (US\$)	NOTABLE INVESTORS
Twist Bioscience	2013	DNA synthesis	\$82.11 million	Yuri Milner (Internet-company investor)
Zymergen	2013	Microbial-strain optimization	\$44 million	Obvious Ventures; Eric Schmidt (Alphabet executive chairman)
Ginkgo Bioworks	2008	Microbial engineering	\$54.12 million	Matt Ocko (Facebook and Zynga investor)
Bolt Threads	2009	High-performance fibres	\$40 million	Peter Thiel and Max Levchin (PayPal co-founders)
Transcriptic	2012	Robotics for biology labs	\$14.37 million	Jerry Yang (Yahoo co-founder)
Riffyn	2014	Software	\$1.8 million	O'Reilly AlphaTech Ventures
Emerald Therapeutics	2010	Technology platforms	\$34 million	Peter Thiel and Max Levchin

of SynBioBeta industry group (see ‘Money for microbes’). Overall, 24 newly created synthetic-

Microbes, which aims to engineer yeast that can synthesize chemicals using methane as a

# A gigantic floating pipe covered in solar panels could help save California from drought



2000 foot long desalinization tube that work on solar panel power. See <http://www.businessinsider.com/solar-powered-desalinization-tube-2016-8>



# Pulling water from air with lots of surface capture, from MIT Technology

- **How to Pull Water Out of Thin Air, Even in the Driest Parts of the Globe: Box has about the surface area of a football field**
- <https://www.technologyreview.com/s/604137/water-from-desert-skies/>

