

GMIS-UNIDO-ITU
Special Session
October 1st, 2018


IoT, Big Data & AI: Driving Insights for Smarter, More Livable Cities

Kelly Schlamb
Cognitive Systems, IBM

 kschlamb@ca.ibm.com

 [@KSchlamb](https://twitter.com/KSchlamb)





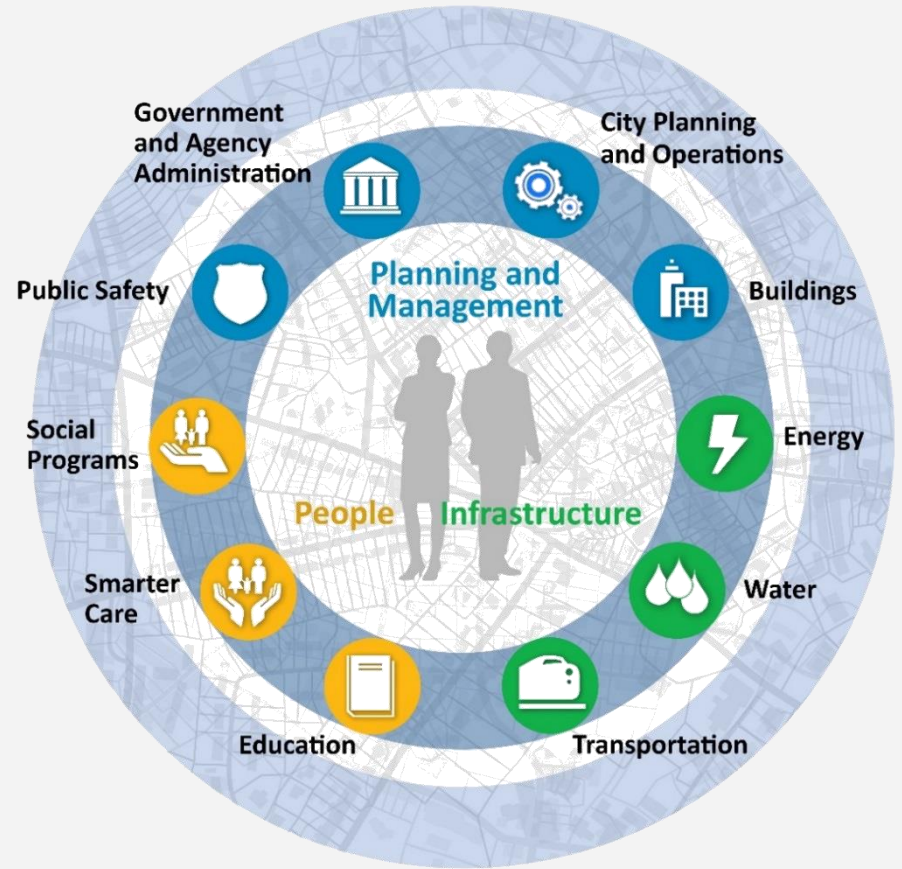
55% of world's population lives
in urban centers → 68% by 2050

Thousands of new cities will
be created during this time

2.5B more people to house,
employ, educate, transport,
keep healthy & safe, etc.

Problem scenario for cities tackling
crime, resource conservation,
pollution, traffic and safety

Smart, sustainable cities are realizing their full potential by **integrating** across functions, **capitalizing on new insights**, **creating system-wide efficiencies** and **collaborating** in new ways



27.1 billion networked devices and connections by 2021

45 billion cameras by 2022

By 2020, 1.7 MB of data will be generated for each person on Earth every second

2.5 quintillion bytes of data generated daily



830 million connected wearable devices by 2020

75 billion IoT devices by 2025
... 1/4 for Smart Cities

3.5 billion cellular IoT connections by 2023



27.1 billion networked devices and connections by 2021

45 billion cameras by 2022

By 2020, 1.7 MB of data will be generated for each person on Earth every second

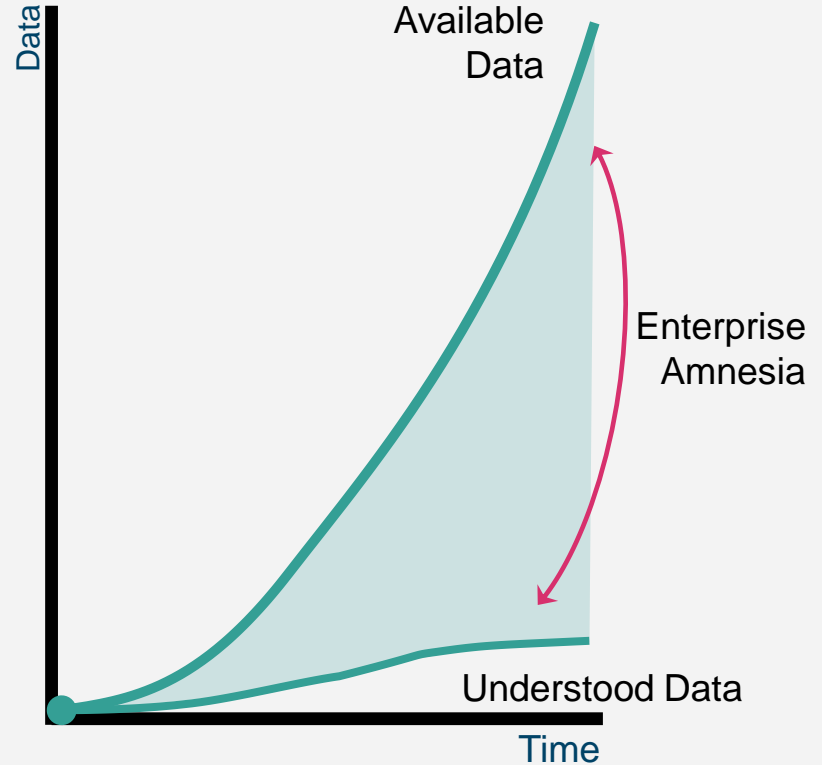
2.5 quintillion bytes of data generated daily



830 million connected wearable devices by 2020

75 billion IoT devices by 2025
... 1/4 for Smart Cities

3.5 billion cellular IoT connections by 2023



27.1 billion networked devices and connections by 2021

45 billion cameras by 2022

By 2020, 1.7 MB of data will be generated for each person on Earth every second

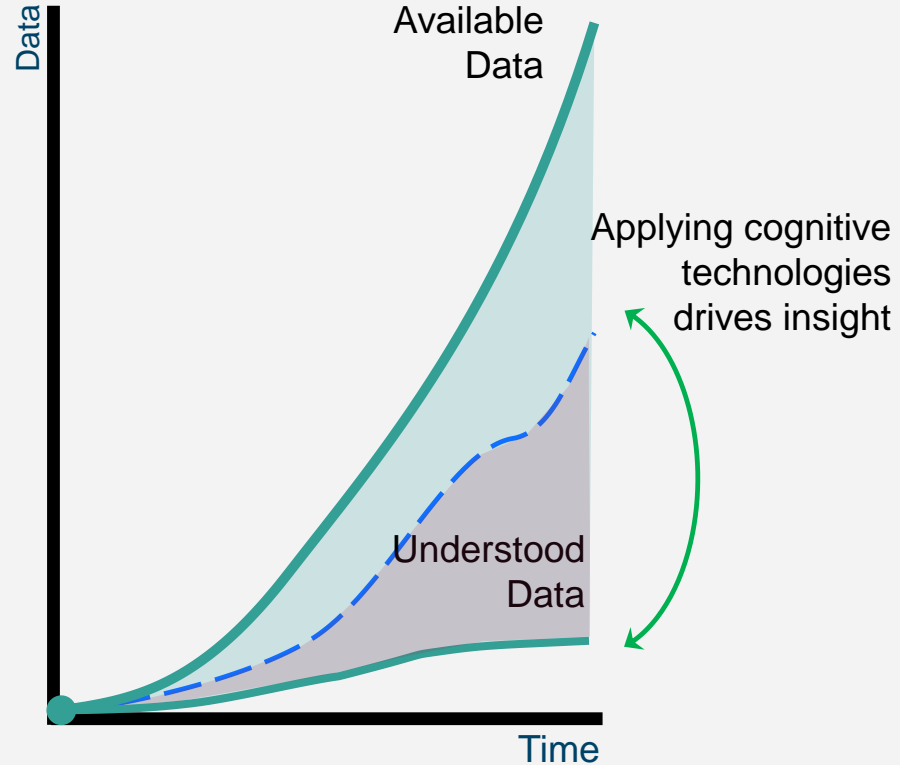
2.5 quintillion bytes of data generated daily



830 million connected wearable devices by 2020

75 billion IoT devices by 2025
... 1/4 for Smart Cities

3.5 billion cellular IoT connections by 2023



Data → **Insights** → **Action**

Technology Challenges & Considerations

Data

- Volume, variety, velocity, ...
- Integration
- Provenance
- Governance & security
- Privacy

Skills

- Data science (ML/DL) is hard
- Skills in high demand
- Collaboration
- Proprietary vs. open source tools & frameworks

Infrastructure

- Cloud (public, private, hybrid)
- ML/DL-optimized hardware
- Accelerators (GPUs)
- Reliability/availability
- Security

Privacy & security built-in at all levels – trusted, auditable, explainable



Data → **Insights** → **Action**

Technology Challenges & Considerations

Data

- Volume, variety, velocity, ...
- Integration
- Provenance
- Governance & security
- Privacy

Skills

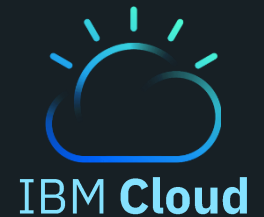
- Data science (ML/DL) is hard
- Skills in high demand
- Collaboration
- Proprietary vs. open source tools & frameworks

Infrastructure

- Cloud (public, private, hybrid)
- ML/DL-optimized hardware
- Accelerators (GPUs)
- Reliability/availability
- Security



PowerAI
Enterprise
PowerAI
Vision



Smarter Cities – Example Benefits of IoT, Big Data & AI

Public Safety



- Accident prevention
- Safety code enforcement
- Smart lighting
- Improved emergency responses
- Identification of children at risk
- Predicting and responding to major events (weather, earthquakes)

Government & Public Service



- Improved efficiencies
- Better, more informed decisions
- Asset and facility management
- Fraud detection
- Policies in tune with citizen needs
- Improved education, student retention
- People/career matching

Business



- Improved efficiencies
- Emissions reduction
- Reduced resource consumption
- New product and service innovations
- Operational safety
- Smarter transport of goods

Healthcare



- Early identification of health issues
- Targeted health education
- Personalized healthcare
- Improved admin & faster service
- Fast response to public health events

Utilities & Infrastructure



- Load forecasting
- Demand management
- Predictive maintenance
- Resource conservation

Law Enforcement

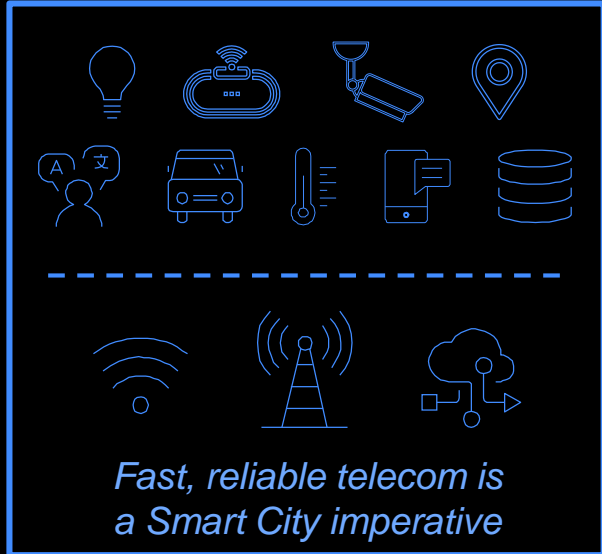


- Identify crimes in progress
- Facial recognition of criminals
- Identify stolen vehicles
- Find missing people
- Analyze suspicious activity
- Crowd management

Public Transportation



- Self-driving buses/vehicles
- Traffic management
- Planning and route management
- On-demand service scheduling
- Smart parking





near miss

car

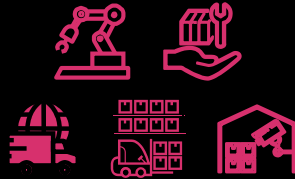
people

car



car

IoT, Big Data & AI in Manufacturing & Industrialization



Use Cases

- Quality control
- Production planning
- Infrastructure inspection & proactive maintenance
- Factory management
- Supply chain management
- Product development (R&D)
- Emissions reduction
- Transportation logistics
- Employee safety
- Inventory control
- Customer satisfaction
- +++

Derived Benefit from Smarter Cities Initiatives

- Smarter resource management & consumption
→ *lower production costs*
- Educated, healthy and prosperous citizens
→ *Higher demand for products & services*
→ *More skilled workforce*
(*focus on innovation, management, new technology operations, +++*)

Survey of CxOs from outperforming industrial products companies:

64% have already begun investing in AI/cognitive

89% plan to invest in AI/cognitive for quality control



90%
inspection
times



10X
number of
inspections



accident
risk
rate



IBM Power



KEPCO
KEPRI



230,000 train cars ...

52,300 km of track ...

2,000 sensors detecting changes in speed,
temperature, vibration and alignment

IBM Analytics monitoring 100,000
data points every day

... helping prevent trouble before it starts

BNSF
RAILWAY

IBM

Japanese steel producer augments human knowledge and diagnostic skills with AI discovery

At 3,000 degrees Celsius, a lot can go wrong

Business Challenge

- Detect and fix equipment failures to keep production schedules moving and workers safe
- Technicians lacked insights into this complex systems beyond their own expertise

Cognitive Transformation

- AI used for safer, more efficient plants, helping technicians diagnose, fix and prevent failures
- Mines vast pools of siloed, unstructured Japanese text from failure reports and inspection logs
- Solution responds to natural language queries such as, “What would cause a pressure valve to stick in the blast furnace?”



Meuller, Inc. gains a cognitive edge over their competition

Mueller, Inc. manufactures steel sheds and roofs – employing a workforce of 750 across four manufacturing and distribution centers in Southern US

How they use AI and analytics:

- Revenue Forecasting
- Supply chain management
- Customer insights & marketing
- Employee health & safety
- Talent management & skills



113% ROI in 1 year

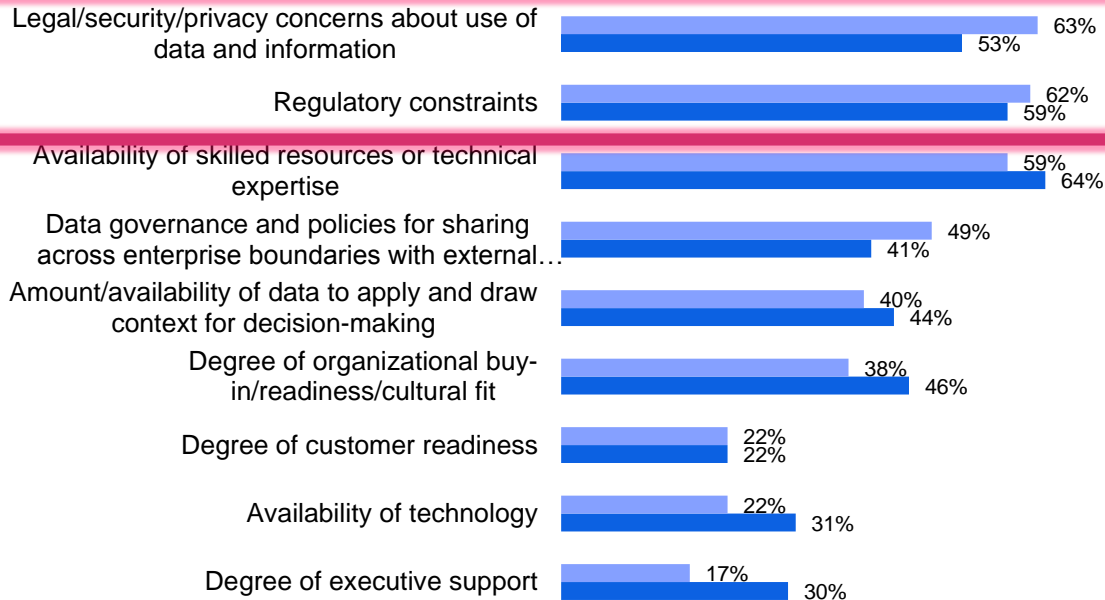
Scrap metal waste reduced by 20-30%

Report creation time reduced by 90%

90% improvement in data processing time

No data strategy is complete without a globally relevant but regionally tailored approach to data privacy

Barriers to implementing AI



Two of the *top barriers* cited by outperformers in 2018 relate to:

- *Legal/security/privacy concerns about the use of data (63%)*
- *Regulatory constraints (62%)*

Data handling must be at forefront of all AI initiatives – with clarity, transparency and stakeholder buy-in

Preparing for the Cognitive Era

Education paths for next generation technical, data science, and business professionals

- Flexible, agile curriculums
- Academic alignment with industry

Policies and Practices

- Close partnerships between city, academia, industry groups and citizens
- Privacy and data security (with transparency)
- Mitigation of bias in all applications of AI
- Pervasive access to connectivity, technology for all

Promote “Open data” initiatives for data collected

- Foster research, innovation and invention

AI/ML/DL tools, frameworks and technologies

- Majority of software is open-source
- Data Science Platforms offer integration of open-source with proprietary value-add
- Collaboration capabilities are key – productivity, sharing of work and insights

Cognitive infrastructure with cloud-agility

- On-premises, private cloud or public cloud



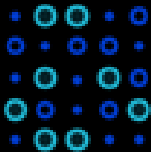
IBM POWER SYSTEM

AC922



An Acceleration Superhighway

Unleash state of the art IO and accelerated computing potential in the post “CPU-only” era



Designed for the AI Era

Architected for the modern analytics and AI workloads that fuel insights



Delivering Enterprise-Class AI

Flatten the time to AI value curve by accelerating the journey to build, train, and infer deep neural networks

Exploring the performance
of transgender athletes p. 322

A threat to innovation
in biomedicine p. 335

How social amoebae manage
a microbiome p. 402

Science

\$15
27 JULY 2018
sciencemag.org

AAAS

SPECIAL ISSUE

FRONTIERS IN COMPUTATION



IBM PowerAI

an Enterprise AI platform

- Accelerate AI wherever you are on your journey
- Democratize AI to empower the many
- Transform data science into a team sport
- Turbo charge ML and DL for faster model development for all disciplines of AI

H₂O.ai

Driverless AI
Auto-ML

IBM

PowerAI Vision
Auto-DL

PYTORCH TensorFlow
Caffe K Keras

+++



redhat.



kubernetes



python

GPU Optimized Servers



AI Optimized Storage



IBM Watson Studio (Local)

A collaborative platform for data professionals, built on open source components with IBM added value



<https://www.ibm.com/cloud/watson-studio>

Explore & Learn

Use Jupyter notebooks (Python, R, and Scala). Code or use drag & drop visualization tools.

Model & Evaluate

Build and optimize models using the top Open Source tools.

Deploy & Predict

Develop and deploy where you want, whether you need to develop behind the firewall or in the cloud.

Monitor & Measure

Measure the performance and results of your models with built in performance monitoring.

Contributing IBM technology and talent to tackle urban challenges



Smarter
Cities
Challenge

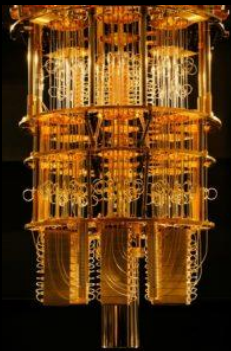
- 130+ cities to date
- Diverse problem areas:
 - Transportation
 - Infrastructure
 - Social services
 - Public safety
 - Environment
 - Economic development
 - ...

<https://www.smartercitieschallenge.org/>

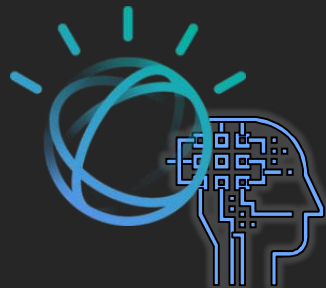


Smarter Cities will benefit from continued R&D at IBM

Quantum Computing



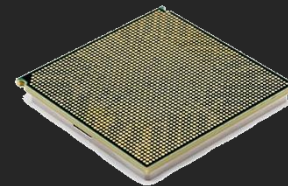
Artificial Intelligence



Cloud



Semiconductor Technology



Security



Blockchain



Analytics



Internet of Things



AI is now in the hands of the many, not just the few

Use cases and opportunities
for change are limitless

Disruptors will be those who leverage
AI to solve problems in new ways

*“AI doesn’t need more researchers,
it needs more products”*

(<https://www.theglobeandmail.com/business/commentary/article-ai-doesnt-need-more-researchers-it-needs-more-products/>)

GMIS-UNIDO-ITU
Special Session
October 1st, 2018

IoT, Big Data & AI: Driving Insights for Smarter, More Livable Cities

Kelly Schlamb
Cognitive Systems, IBM

 kschlamb@ca.ibm.com

 [@KSchlamb](https://twitter.com/KSchlamb)



Thank you