Smart Cities: Overview, Benefits and Challenges

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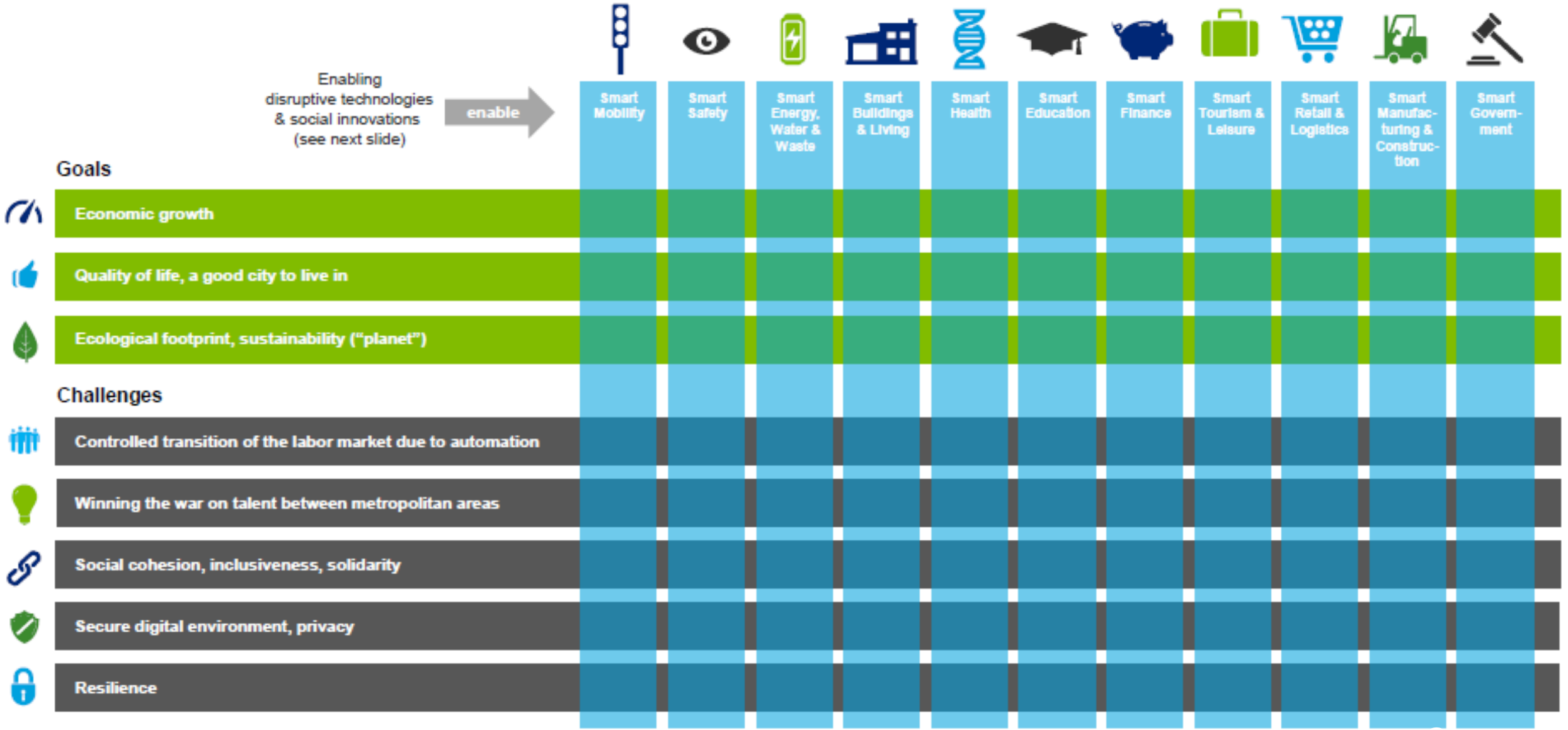
What do we mean with ‘smart cities’?

A city is smart when investments in

- (i) human and social capital,
- (ii) traditional infrastructure and
- (iii) disruptive technologies

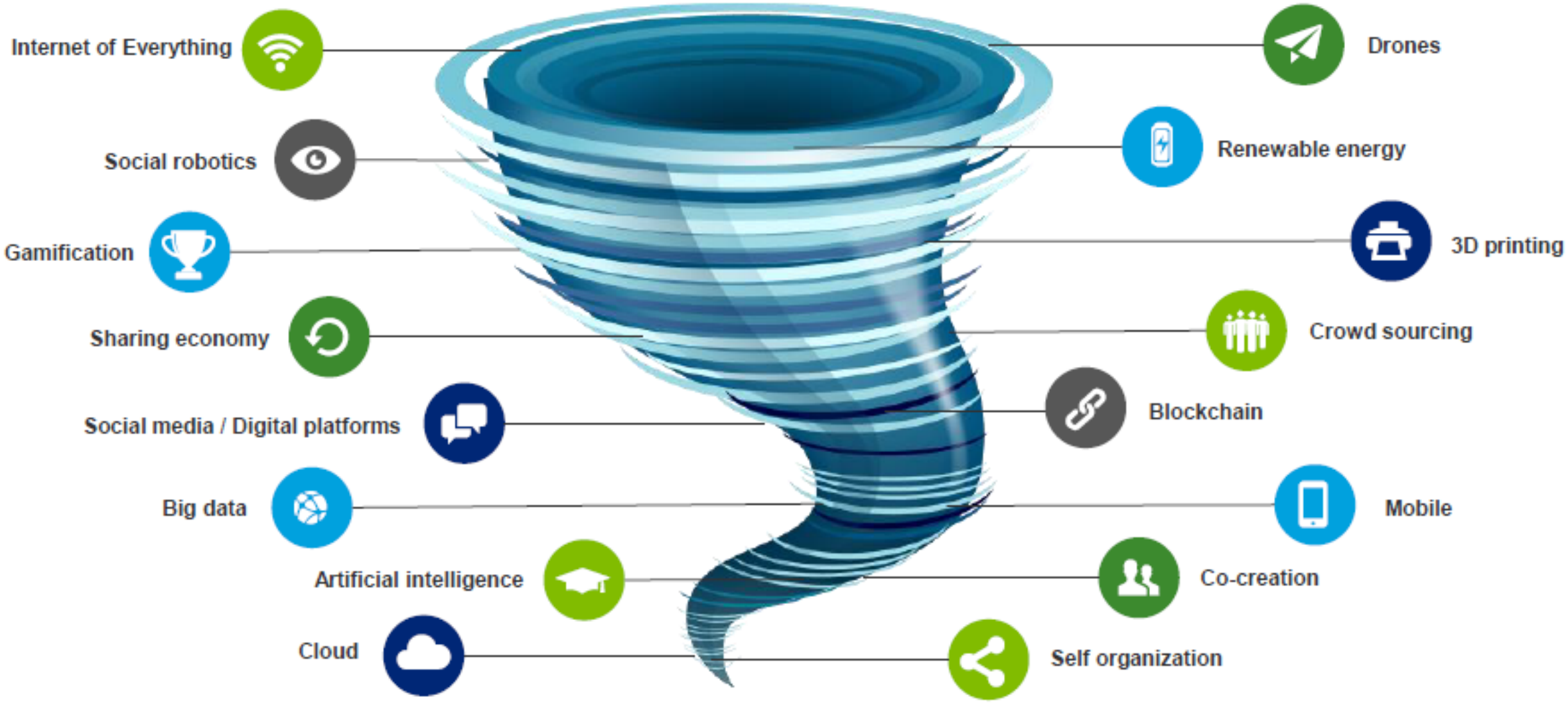
fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.

Smart cities emerge as the result of many smart solutions across all sectors of society



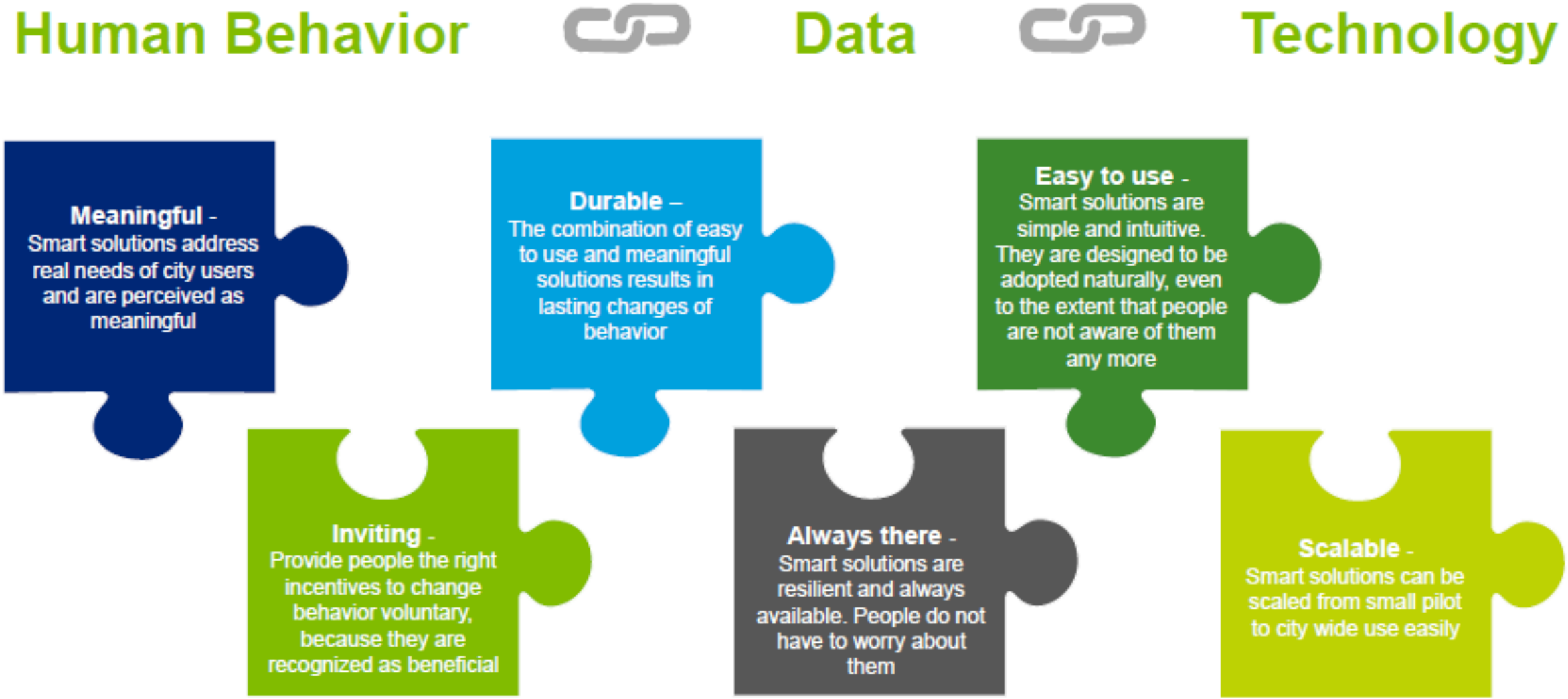
… fueled by a combination of disruptive technologies and social innovations …

Most new technologies and social innovations are disruptive on their own. The combination of them is even more powerful and creates a 'perfect storm' of disruption.



… and combine changing human behavior with the use of data and innovative technology

True smart solutions combine disruptive technological capabilities with changes in human behavior. The latter can only be achieved by simple, intuitive solutions that appeal to real human needs.



Typical smart city benefits are already becoming visible …

Each sector contributes with its own unique innovations to the overall success of the smart city. Harvesting the potential benefits from all relevant sectors is the challenge of the city.

… but the imminence of change and the size of impact differs per industry

- Major disruptions in industries like Retail, Media and Banking are already happening.
- Other industries are expected to follow later.
- Ultimately, our entire economy will be disrupted.
- The Deloitte Digital Disruption Map compares 16 industries on their vulnerability to disruption from two perspectives: the size of the impact and the imminence of change.

The assessment considers factors including:

- The extent to which products and services are delivered physically
- The propensity of customers to use digital channels
- The importance of broadband and computing infrastructure in business operations
- How mobile a company's customers and workforce are, and their average age
- The significance of social media and innovations like cloud computing
- How digital innovation might be inhibited by government regulations or other factors.

Map Classification

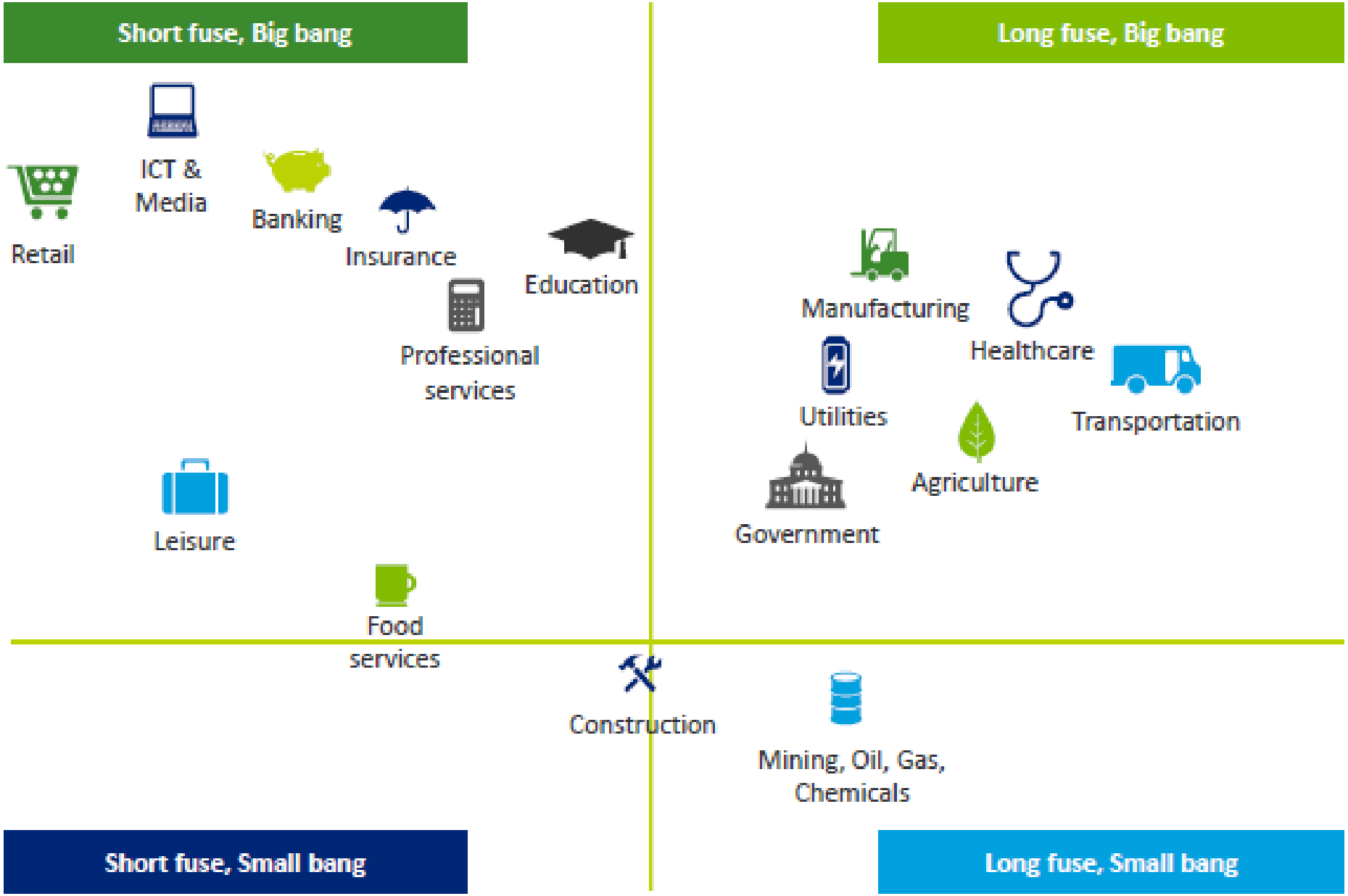
Companies that stand to experience significant digital disruption within the next three years are said to be on **a ‘short fuse’.**

Those that can expect major change in four to ten years are on a **‘long fuse’.**

The size of the impact, **or ‘bang’,** is described as the expected change in percentage terms across a range of key business metrics.

Companies that can expect to see a 15–50 per cent change in their metrics, such as mix of revenue channels or cost structures will experience **a ‘big bang’.**

Below 15 per cent, companies will feel a **smaller ‘bang’.**


Short fuse, Big bang
Long fuse, Big bang
Short fuse, Small bang
Long fuse, Small bang
ICT & Media
Retail
Banking
Insurance
Education
Professional services
Leisure
Food services
Construction
Manufacturing
Healthcare
Utilities
Transportation
Agriculture
Government
Mining, Oil, Gas, Chemicals

Challenge 1: Disruption of the labor market due to progressing automation and use of robotics to replace manual work

The Challenge

- Due to disruptive technologies, many existing jobs will disappear with (frictional) unemployment as result.
- The challenge for the city is to make this transition as smooth as possible by renewing fast and making the turn rapidly.

Research

Researchers of the University of Oxford have analyzed the impact of computerization on 700 jobs. For each job, the researchers estimated the change of that job being fully computerized in the next 10 to 20 years. The results were clear: 47% of total employment has a high probability of disappearing due to computerization. Many of those jobs are in the categories Office and administrative support, Sales and Service.

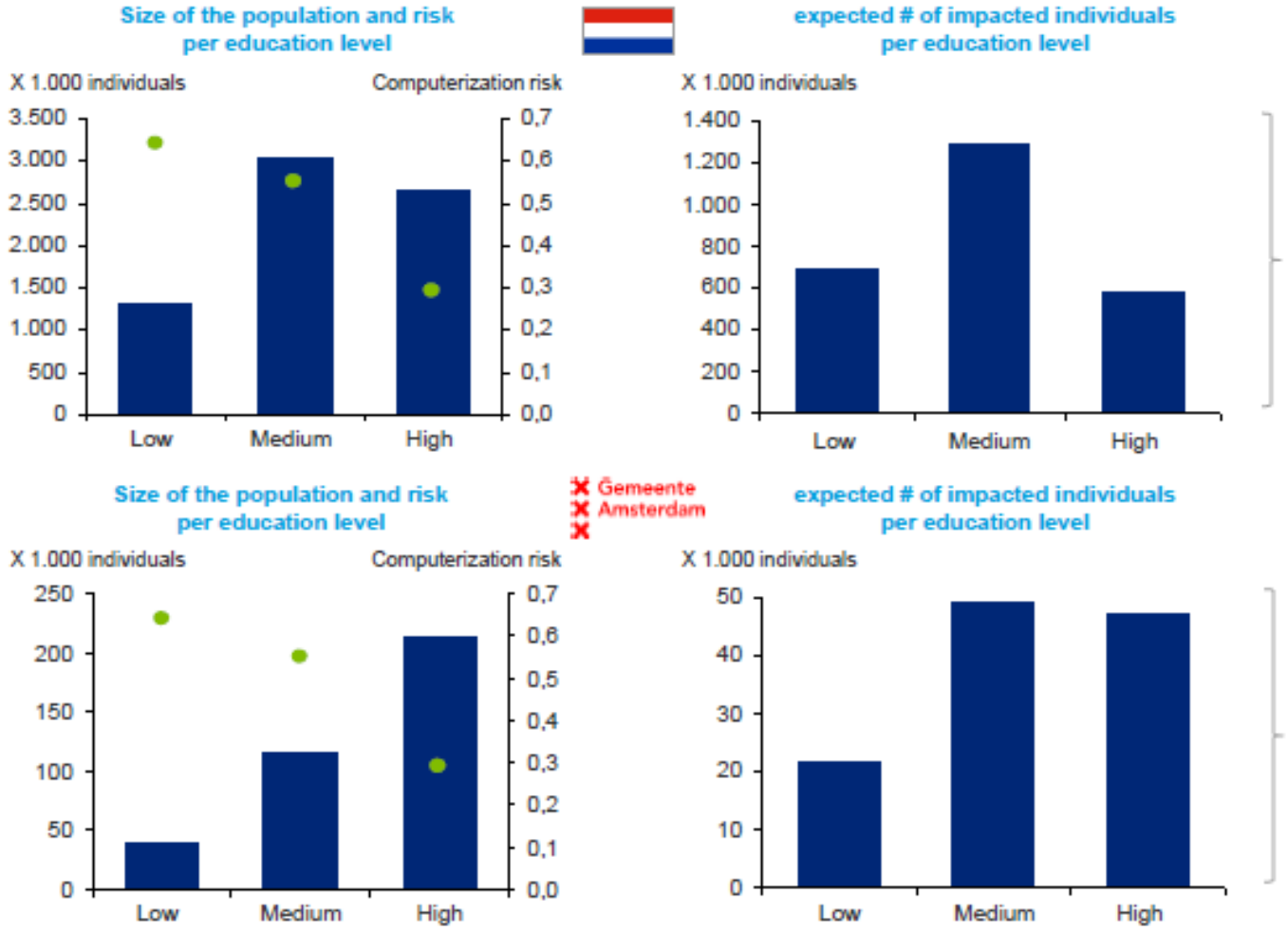
The Impact: two major challenges

- **Unemployment**
  - The pace at which automation and robotics impact the labor market increases.
  - As a result, increased pace existing jobs disappear and people become unemployed.
  - People need to adapt their skills to the changing environment.
- **Income inequality**
  - The benefits of computerization of human labor will be reaped by owners of companies.
  - Human labor becomes a less important factor, due to which will lead to decreased wages.

Challenge 1: Disruption of the labor market

10 COMMON OCCUPATIONS LEAST AT RISK (PROBABILITY < 0.1)	10 COMMON OCCUPATIONS HIGHLY AT RISK (PROBABILITY > 0.9)
1. First line supervisors of mechanics, installers and repairers, production workers	1. Telemarketers
2. Dentists, orthodontists and prosthetists	2. Insurance underwriters, Insurance claims clerks, Insurance appraisers
3. Child, family and school social workers	3. Cargo and freight agents
4. Physicians and surgeons	4. Packaging and filling machine operators
5. Teachers and instructors	5. Procurement clerks
6. Mental health counselors	6. Bookkeeping, accounting and auditing clerks
7. Human resource managers	7. Real estate brokers
8. Recreation workers	8. Counter and rental clerks
9. Training and development managers	9. Cashiers
10. Computer systems analysts and computer systems administrators	10. Dental laboratory technicians

Challenge 1: Disruption of the labor market - disruption of the labor market in Amsterdam



Conclusion
The impact on the Amsterdam labor force (32%) is smaller than the national average (37%).
The impacted population however has a significant higher share of higher educated people

Challenge 2: Winning the ‘war on talent’ - the ‘demand/supply’

The Challenge

A Smart is able to attract and retain high-tech and creative talent.
The megacities of the word are therefore competing for this talent.

How to win

The following ingredients stimulates attractiveness for talent:

- An urban 24*7 lifestyle that fits the needs of young professionals to live, work and relax.
- Presence of reputable knowledge institutions and research that is able to attract scientific talent.
- Presence of an innovative financial sector provides access to capital in all its forms.
- Stimulation of start-ups.

Challenge 3: Social cohesion, inclusiveness and solidarity

The Challenge
Although smart solutions have the potential to connect people and to increase social cohesion.
Three main causes for not being reaped by all groups

1. some groups have a lack of ‘digital savviness’.
2. increasing insight in risks due to emerging big data may put solidarity under pressure.
3. smart solutions can be used by groups to organize themselves and to create ‘digital gated communities

Sustainability and social cohesion: The search is for smart solutions, the result of co-creation between government and businesses, with scalable business models.

“Our one confident prediction is that digital technologies will bring the world into an era of more wealth. But there’s no guarantee that everyone will share in the bounty, and that leaves many people justifiably apprehensive. The outcome — shared prosperity or increasing inequality — will be determined not by technologies but by the choices we make as individuals, organizations, and societies.”
– Erik Brynjolfsson

Challenge 4: Security and Privacy – vulnerability to cyber crime

The Challenge

Large volumes of data stored digitally and large numbers of physical objects with an online connection to the Internet.

It is also possible to abuse the possibilities for criminal purposes.

The Impact

- Privacy violation (1) – (digital footprint: purchases and payments, our geographical location and movements, the websites we visit, the films and series we watch on Netflix, the photos we store in our iCloud, etc.)
  1. digital systems can be hacked with unauthorized access to personal data
  2. data analytics has become so powerful it can combine data sets to infer someone's lifestyle, habits and more.
- Hacking of connected objects (2) – With the Internet of Things, all kinds of machines become connected to the Internet and the role of humans diminishes.
  - connected objects are vulnerable for hacking.

- Future crimes (3) – The increasing digitization causes a paradigm shift in crime. One of the characteristics of 'future crime' is its almost unlimited scalability.
  - Traditionally, crime was always restricted by physical barriers.
  - When the crime scene shifts from the physical world to the digital world, these limitations no longer exist and crime becomes scalable too.

"More connections to more devices means more vulnerabilities. If you control the code, you control the world." – Marc Goodman

"All inventions have unintended consequences." – Marc Goodman

Challenge 5: Resilience - The ability to prepare for and adapt to changing conditions, and withstand and recover rapidly from disruptions due to deliberate attacks, accidents or naturally threats

The Challenge

An increasing dependency on digital technologies.

The challenge is to make digital infrastructure and smart solutions resilient.

How to win

City resilience consists of three different aspects:

- ❖Ensuring continuity of critical services
- ❖Incident
- ❖Crisis management