



# **CLINGENDAEL FUTURES**

**THE TECHNOLOGY AND INNOVATION LANDSCAPE OF 2020**

**SEPTEMBER 2013**

**Clingendael**

Netherlands Institute of International Relations

**THE FOLLOWING IS THE VISUAL SUMMARY OF FUTURES RESEARCH CONDUCTED ON THE TECHNOLOGY AND INNOVATION LANDSCAPE OF 2020 ON BEHALF OF THE MINISTRY OF FOREIGN AFFAIRS & THE MINISTRY OF DEFENSE OF THE NETHERLANDS.**

**THESE GRAPHICS REPRESENT THE PUBLIC VERSION OF THE TOTAL RESEARCH ORGANIZED AS AN AT-A-GLANCE GUIDE FOR TIME-CRUNCHED POLICY-MAKERS. THIS VISUAL REPORT WAS DESIGNED TO ACCOMPANY AN IN-HOUSE PRESENTATION FOR CLIENTS IN WHICH THE MATERIAL IS FURTHER AND FULLY ELUCIDATED.**

**IF YOU ARE INTERESTED IN ADDITIONAL INFORMATION ON THIS PROJECT, OR WISH TO WORK WITH CLINGENDAEL FUTURES, PLEASE CONTACT:**



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# 10 KEY DRIVERS IN SHAPING THE TECHNOLOGY LANDSCAPE OF 2020:

## POLITICAL DRIVERS

1. NATION STATE EROSION & RISE OF DIGITAL NON-STATE ACTORS  
.....
2. HARDENING OF IDEOLOGICAL DIVISIONS  
.....
3. LACK OF INNOVATION GRAND STRATEGY

## SECURITY DRIVERS

1. SECRECY CULTURE  
.....
2. A REVERSAL IN THE RELATIONSHIP BETWEEN ENTERPRISE & SECURITY

## ECONOMIC DRIVERS

1. GLOBAL ECONOMIC SLOWDOWN  
.....
2. UNCERTAINTY REGARDING TTIP

## SOCIO-CULTURAL DRIVERS

1. RISE OF GLOBAL MIDDLE CLASS DEMOGRAPHIC  
.....
2. INDIVIDUAL EMPOWERMENT  
.....
3. MILLENNIAL GENERATION INFLUENCE

ACTING ON THESE DRIVERS ARE 3 SIGNIFICANT FORCES:

### LEVEL 1 FORCE = THE STATE TRADE & LOGISTICS

CHALLENGES FOR THE STATE AS THE PROVIDER & GUARANTOR OF REGULATION & SECURITY (BORDER & OTHERWISE)

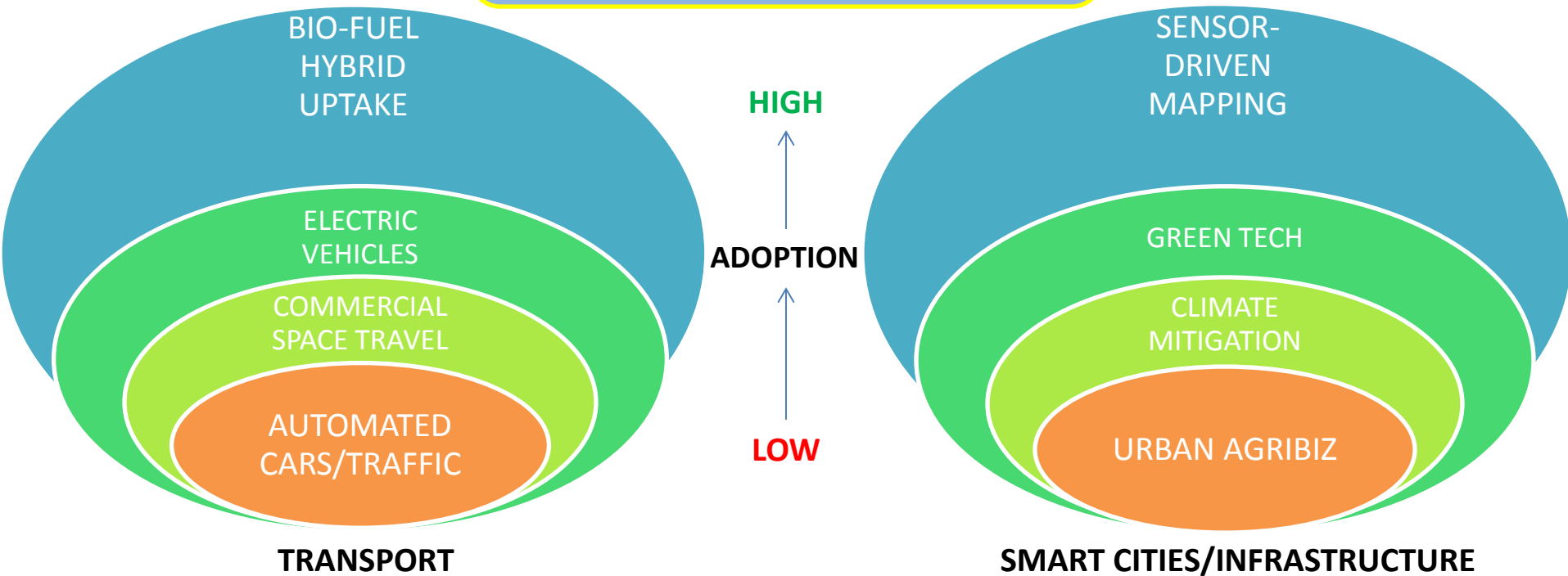
### LEVEL 2 FORCE = REGIONAL/GLOBAL BALKANIZATION

BOUNDARIES IN ORIENTATION, BELIEFS AND PRACTICE COLLIDE WITH SECURITY REALITIES

### LEVEL 3 FORCE = INDIVIDUALS POPULISM

DISSATISFACTION WITH THE STATE PARALLELS GLORIFICATION OF THE INDIVIDUAL

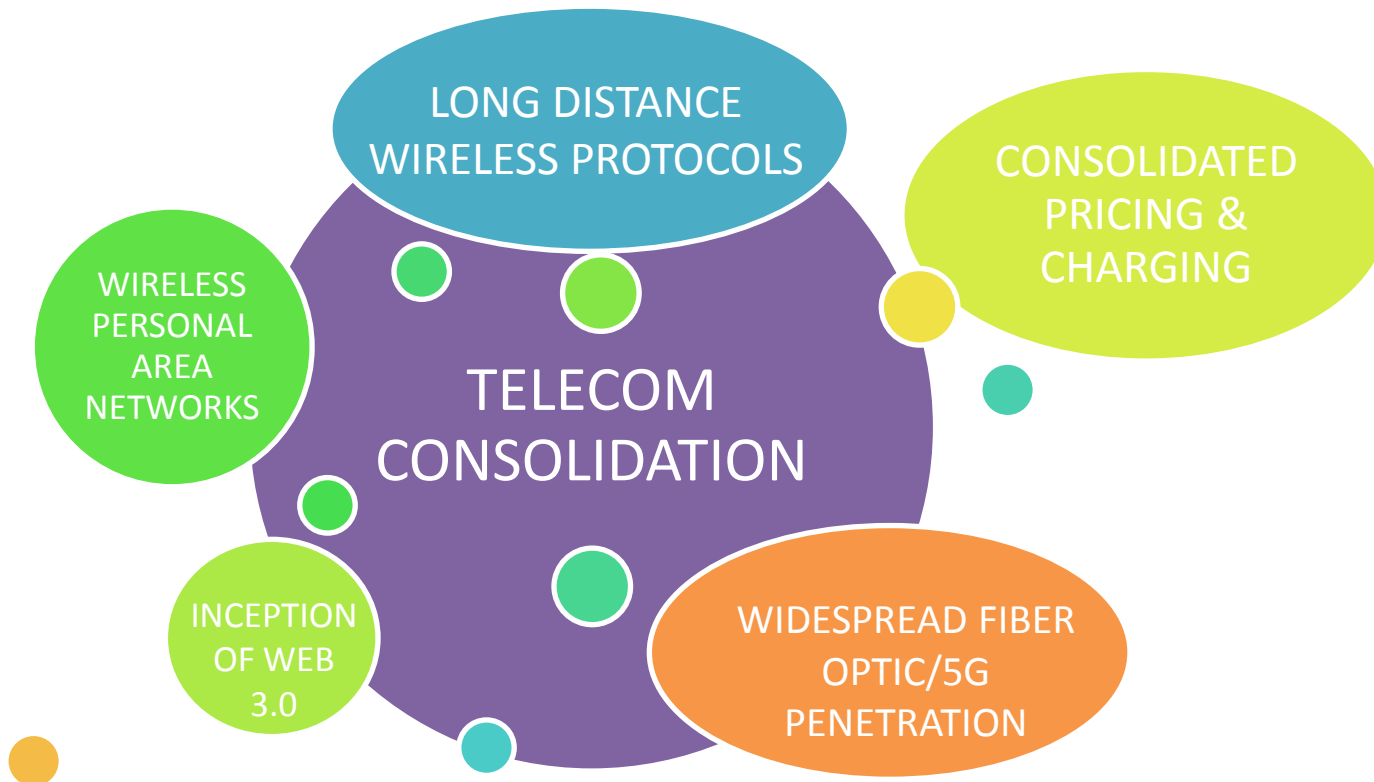
**CATEGORY ONE:**  
**MOBILITY/  
INFRASTRUCTURE**



**LANDSCAPE DETAILS:**

- GREATEST ADVANCEMENTS BY 2020 WILL BE FOUND IN HYBRID FUEL TECHNOLOGIES AND APPLICATIONS; BIO-FUELS ARE COMPETITIVE WITH FOSSIL FUELS; APPLICATIONS DRIVE GREATER ADOPTION OF SENSOR MAPPING, ESPECIALLY FOR CRISIS MONITORING
- COMMERCIAL SPACE TRAVEL GROWS; MILITARY SPACE PROGRAM EXPANSION—LIKE THE USD\$30 BILLION EVOLVED EXPENDABLE LAUNCH VEHICLE (EELV) ROCKET PROGRAM—WILL TAKE ADVANTAGE OF NEW GENERATION TECHNOLOGIES
- GREEN TECH BUBBLE DEFLATES, BUT SOME KEY INNOVATIONS ADVANCE
- STILL LONG WAY TO GO ON AUTOMATED CARS & SMART CITY NEARSHORING AGRIBUSINESS

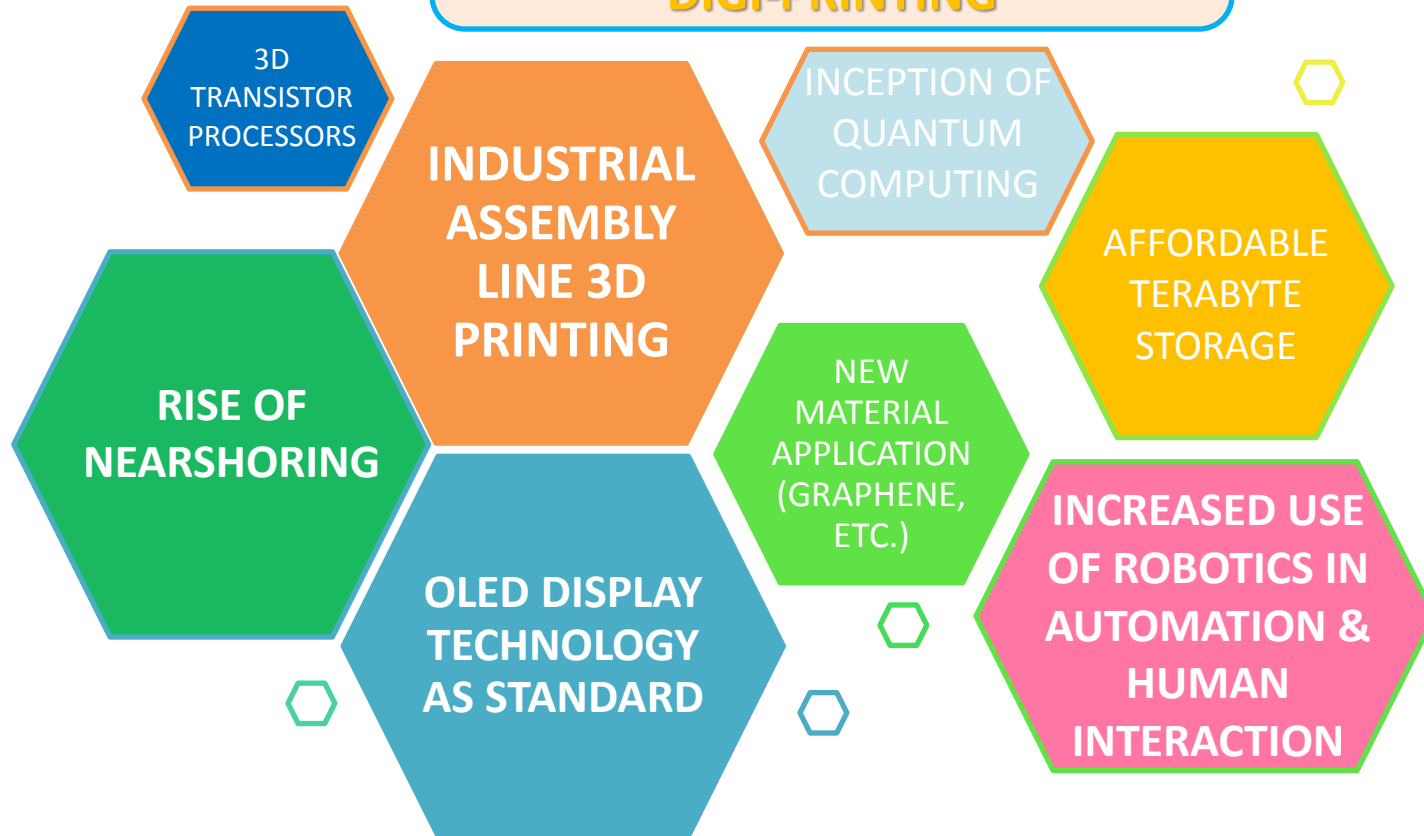
**CATEGORY TWO:**  
**TELECOMS/  
INFORMATION TECHNOLOGY**



**LANDSCAPE DETAILS:**

- OPEN PLATFORMS BECOME DOMINANT
- TELECOM CONSOLIDATION RUNS IN PARALLEL TO INCREASED REGULATION AS PRICES FOR FASTER CONNECTIVITY DROPS
- PUBLIC CONCERNS OVER PRIVACY LEAD TO INCREASED USE OF PERSONALIZED NETWORKS
- GLOBAL CONNECTIVITY INCREASES; LONG-DISTANCE WIRELESS PROTOCOLS ADVANCE KEY NEEDS IN SUCH AREAS AS EMERGENCY/CRISIS MANAGEMENT
- WEB 3.0 BECOMES ENTRENCHED AS SEMANTIC APPLICATIONS & MACHINE INTELLIGENCE RISE

**CATEGORY THREE:**  
**MANUFACTURING/  
DIGI-PRINTING**



**LANDSCAPE DETAILS:**

- **ECONOMIC CONSIDERATIONS DEMAND GREATER USE OF NEARSHORING AND JUST-IN-TIME MANUFACTURING, WHICH LEADS TO EXPANSION OF ASSEMBLY LINE 3D PRINTING**
- **AS 3D PRINTING EXPANDS, SELF REPLICATING MACHINES & MOLECULAR PRINTERS ADVANCE BREAKTHROUGHS: HOUSING, AEROSPACE, MEDICINE, AUTOMOTIVE & TELECOMMUNICATION**
- **ROBOTICS USE MORE VISIBLE, ESPECIALLY AS HOME DEVICES AND ASSISTANTS**
- **GRAPHENE USE UBIQUITOUS & REVOLUTIONARY, LEADING TO FLEXIBLE PHONES, FASTER PROCESSORS, ULTRA-THIN LEDs AND ADVERTISING SCREEN USE**
- **COMPUTING INNOVATIONS PROLIFERATE AS STORAGE GETS CHEAPER**

**CATEGORY FOUR:**  
**BIOLOGICAL BREAKTHROUGHS**

SYNTHETIC  
TISSUE

COMMERCIAL STEM-  
CELL TISSUE SOLUTIONS

BIO-AUGMENTATION

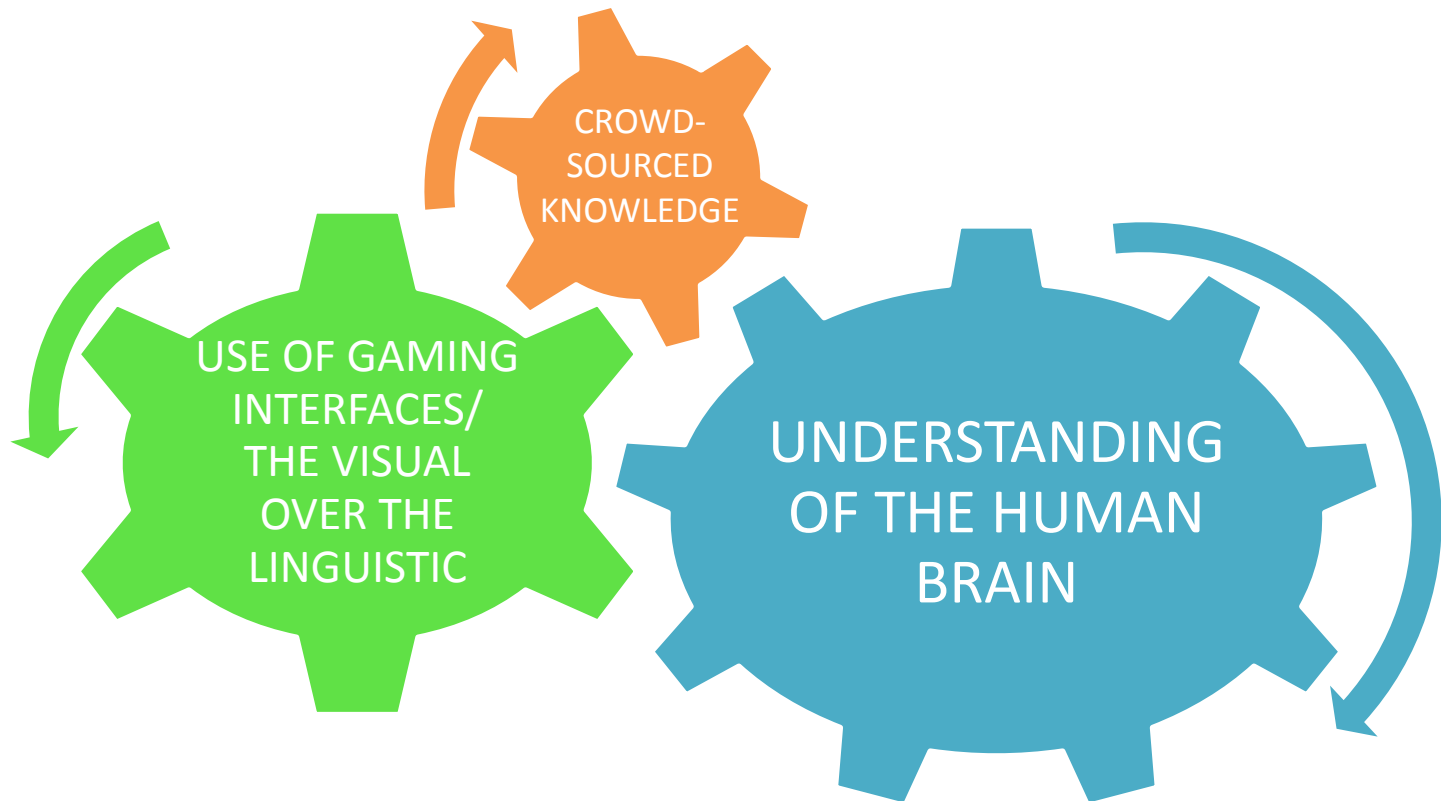
PERSONALIZED MEDICAL DIAGNOSTICS  
(GENOME-BASED MEDICINE)

IMPLEMENTATION OF DATA ANALYTICS IN MEDICAL  
RESEARCH

**LANDSCAPE DETAILS:**

- GENOMIC USAGE BECOMES CHEAP, UBIQUITOUS AND UNCLEARLY REGULATED; IT GENERATES MASSIVE STOREHOUSES OF DATA
- THE USE OF DATA ANALYTICS ENABLE TRIALS OF CUSTOMIZED TREATMENTS FOR CERTAIN DISEASES
- HUMAN AUGMENTATION THROUGH HARDWARE BECOMES MORE PREVALENT, ESPECIALLY FOR THE DISABLED AND ELDERLY
- STEM-CELL ADVANCES TO FIRST COMMERCIAL PRODUCTS LIKE MEAT, CELLULAR REJUVENATION
- SYNTHETIC & BIO-PRINTED ORGANS IN TRIALS; INCREASED EXPERIMENTS WITH SYNTH-BRAINS

**CATEGORY FIVE:**  
**HUMAN KNOWLEDGE**



**LANDSCAPE DETAILS:**

- APPLIED, COGNITIVE AND SOCIAL SCIENCE DEVELOPMENTS WILL YIELD BREAKTHROUGHS IN UNDERSTANDING OF HUMAN BRAIN; SELF-CODING ARTIFICIAL INTELLIGENCE ADVANCES, BUT A.I. INDUSTRIES ARE STILL UNCLEARLY REGULATED
- ADVANCES IN HUMAN UNDERSTANDING: UNIVERSAL TRANSLATION APPLICATIONS AND DEVICES
- MILLENNIAL DEMOGRAPHY FORCES A RISE IN GAMIFICATION AND DYNAMIC ENGAGEMENT
- CROWD-SOURCING AND COLLABORATIVE EFFORTS INCREASE IN UBIQUITY ACROSS ALL PLATFORMS, ESPECIALLY IN KNOWLEDGE AND FORECASTING PLATFORMS



**COMMENTS & QUESTIONS**



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