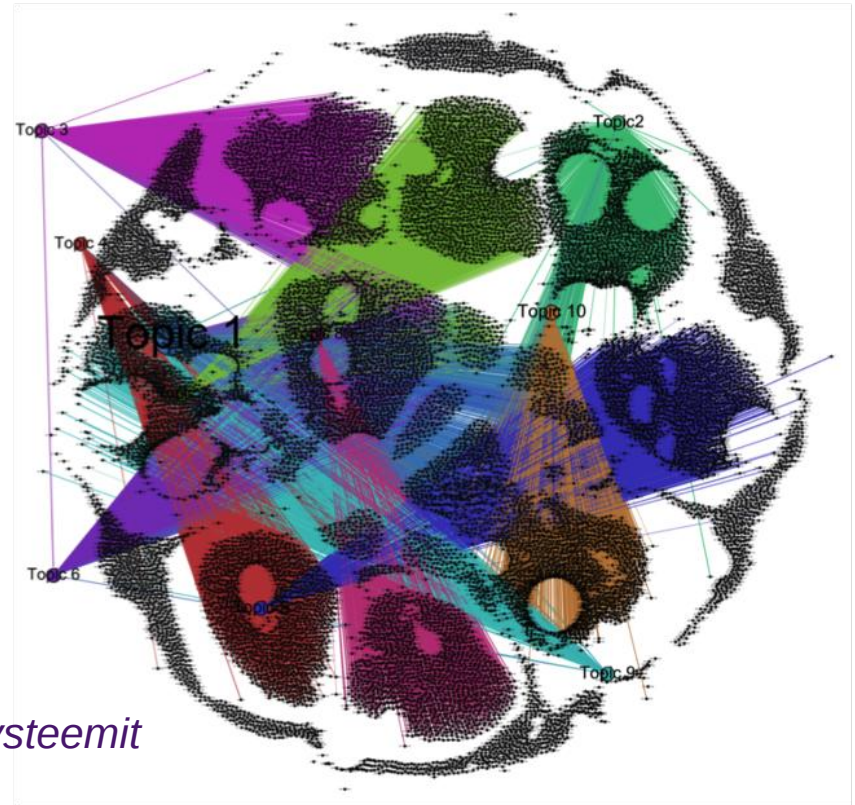


TEQMINE

Biotalous ja digitalisaatio - kohti uutta ekosysteemiä

Hannes Toivanen, Teqmine Analytics Oy
TEKES: Biotalouden liiketoimintakärjet ja ekosysteemit
Kick off –aamu
Pe 15.4.2016 3.2.2016



INTRODUCING BIG DATA
IPR INTELLIGENCE



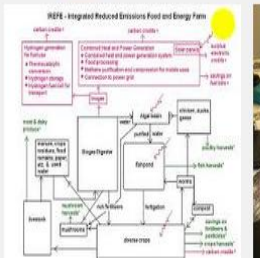
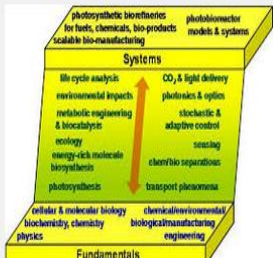
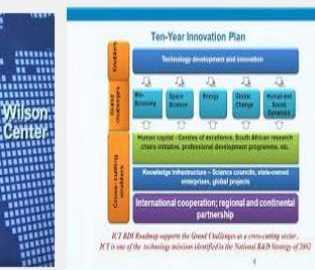
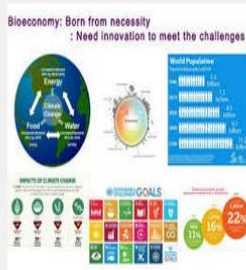
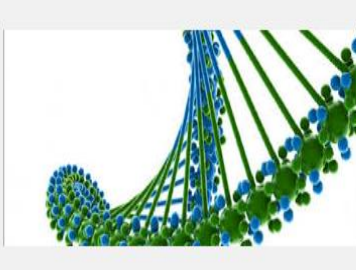
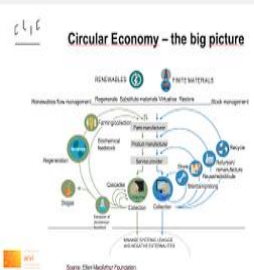
People in the Bioeconomy 2044

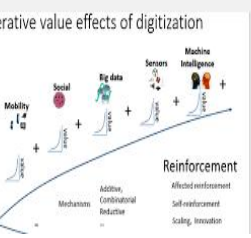
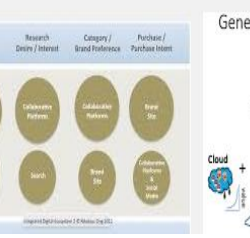
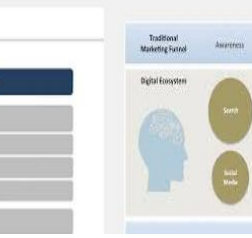
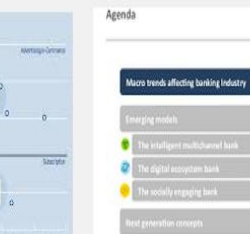
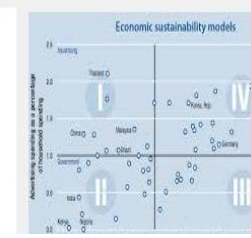
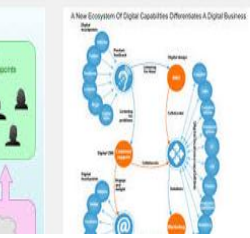
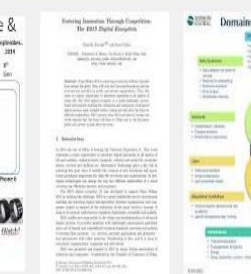
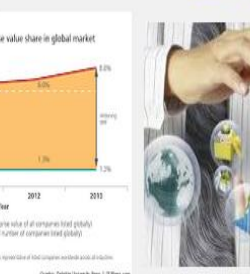
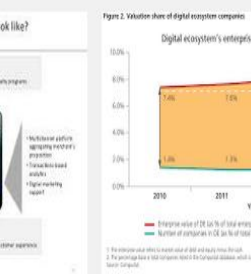
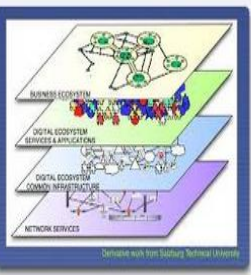
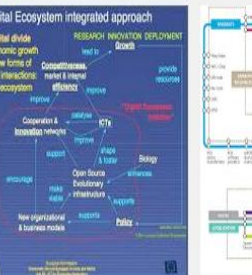
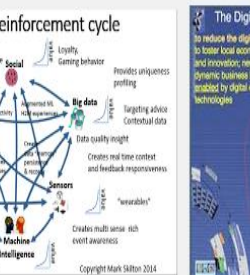
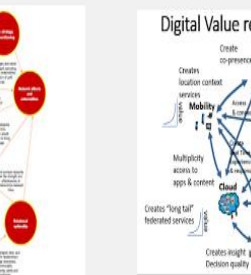
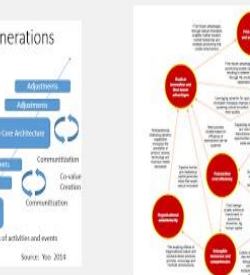
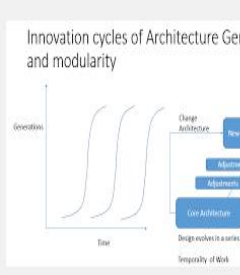
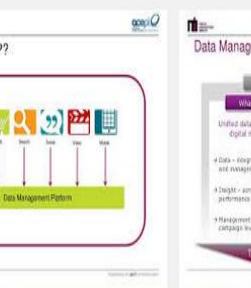
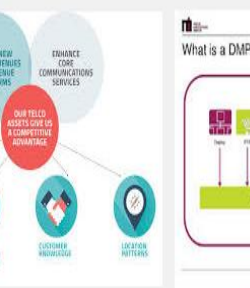
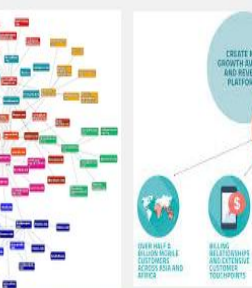
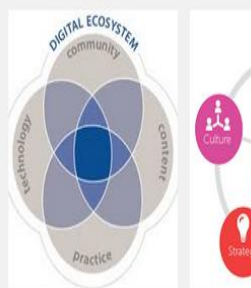
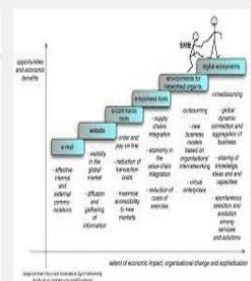
Sustainability, closed circles, and use of biomass woven into solutions

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Bioeconomy value chains (ecosystem)





Mitä syntyy kun kaksi trendiä yhdistetään?

Biotalous ja Digitalisaatio ovat suuria globaalitrendejä

Niiden yhdistyessä, liikenne kulkee (pääsääntöisesti) digitalisaatiosta kohti biotaloutta:

”**Embedded digitalization**”. Digitaalisia teknologioita ja ratkaisuja jotka on sovitettu erityisiin bio-konteksteihin.

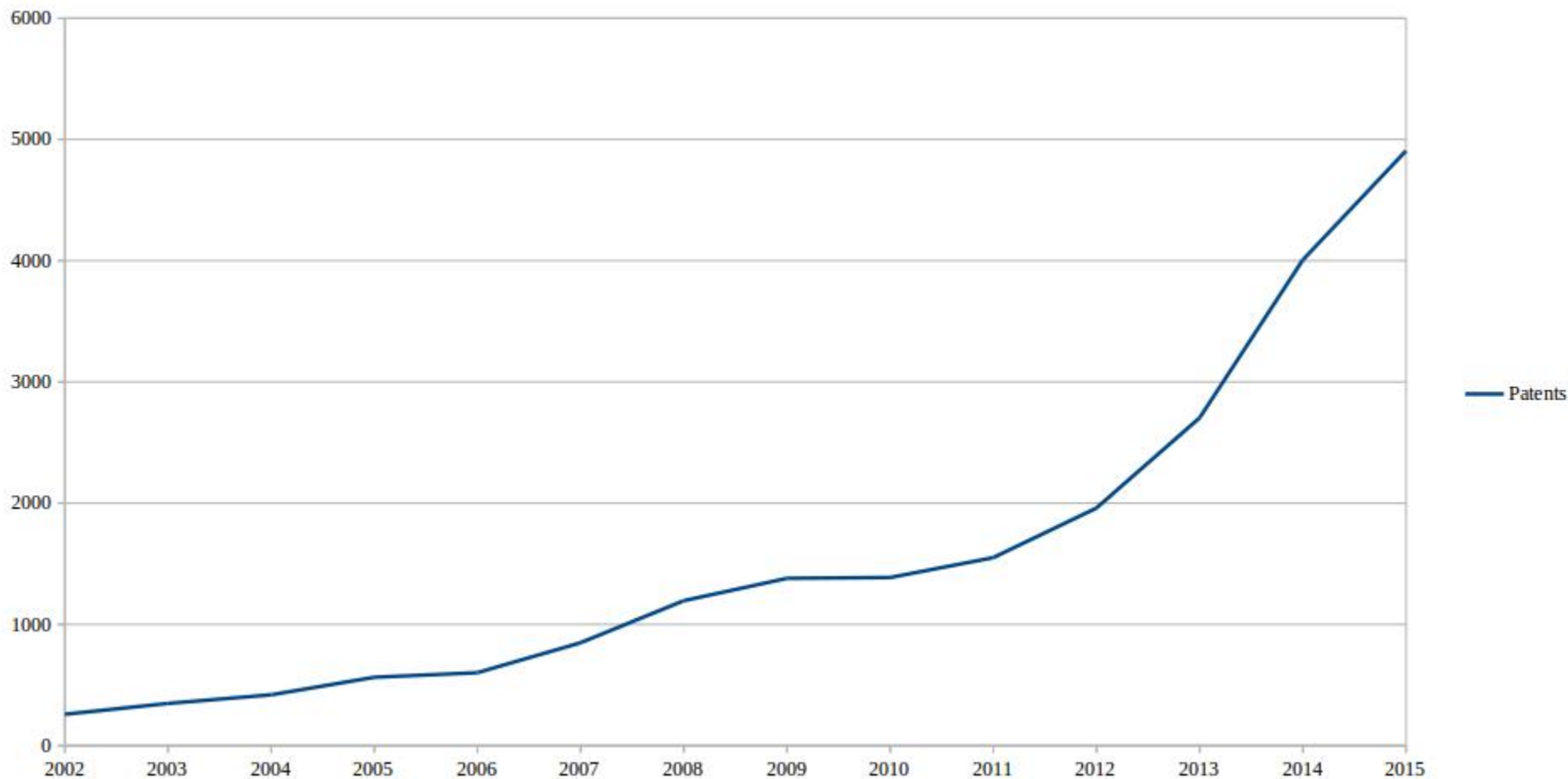
- **Innovaatiot ja keksinnöt ovat ratkaisuja, lähellä markkinoita**
- **Ketkä?** Toimialan uudet ja vanhat toimijat. Suuret ja pienet yritykset.
- **Teknologiat riittävän edistyneitä välittömään markkinoille tuomiseen**



'KRONE ICAN' is a concept that refers to the full range of electronic features available among all KRONE forage harvest machines. The technology comprises all levels of machinery operation and control – from basic machine operation to intelligent fleet management, yield metering and data management features. Depending on the level of specification, the technology allows you to remotely link your harvesters with your office PC and offers wireless communication of job data, navigation, data logging and communication to the office PC, thus helping fleet operators to monitor all processes from the office. Browse through this brochure and find out about the exciting opportunities of KRONE ICAN.

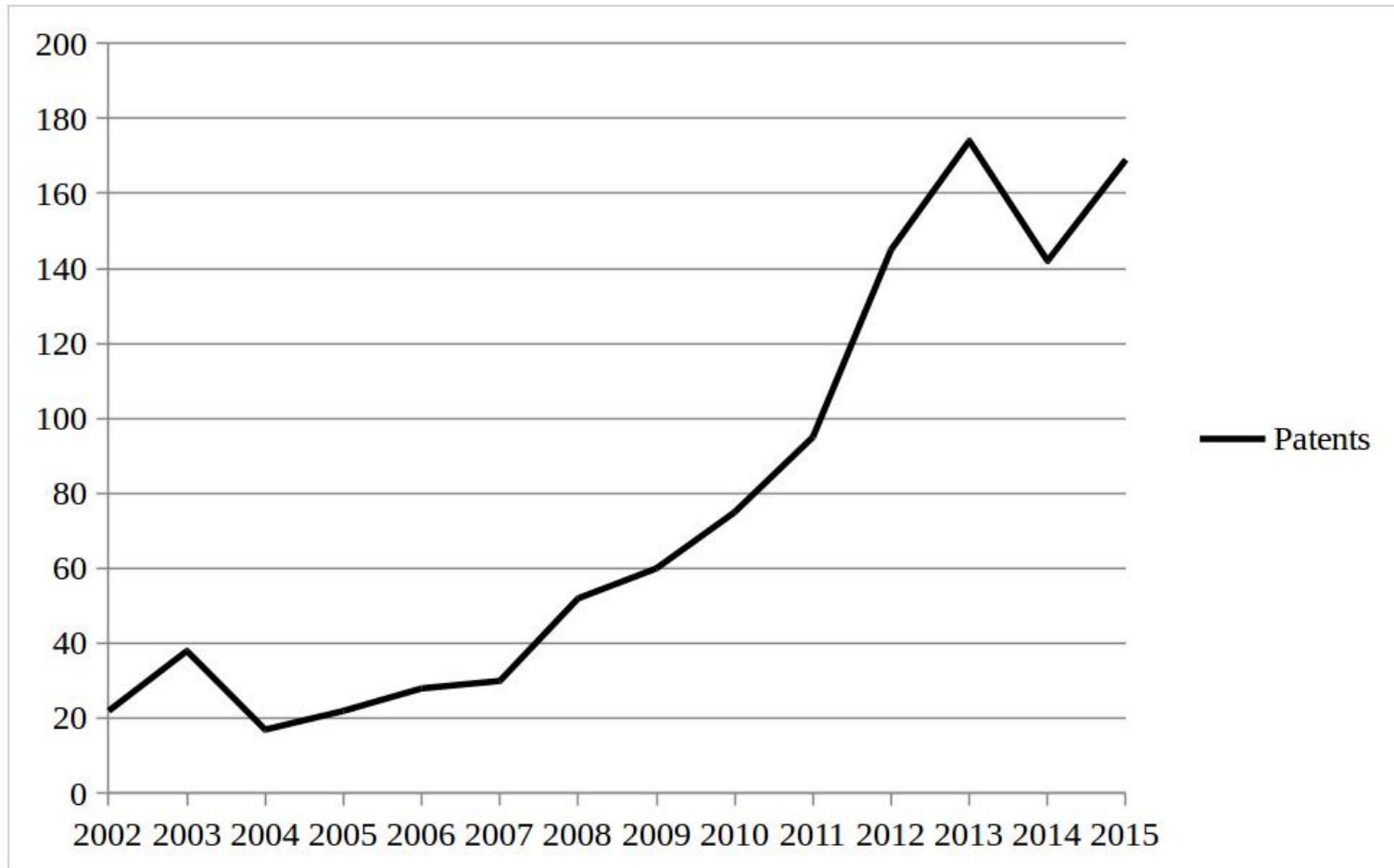


Koneoppimisen teknologiatrendi, 2002-15



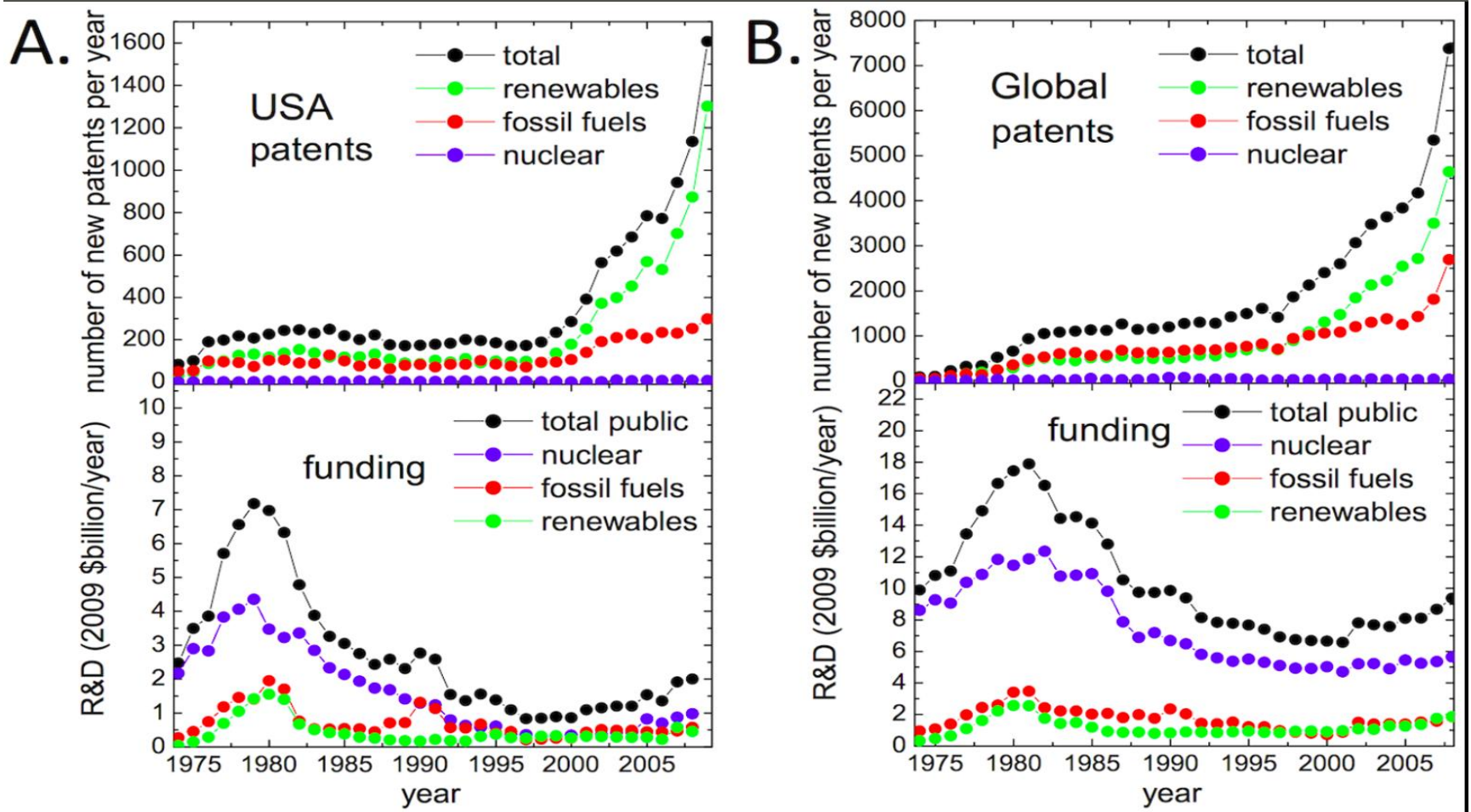
Source: Teqmine; USPTO

Lignoselluloosa-biopolttoaine teknologiatrendi 2002-15



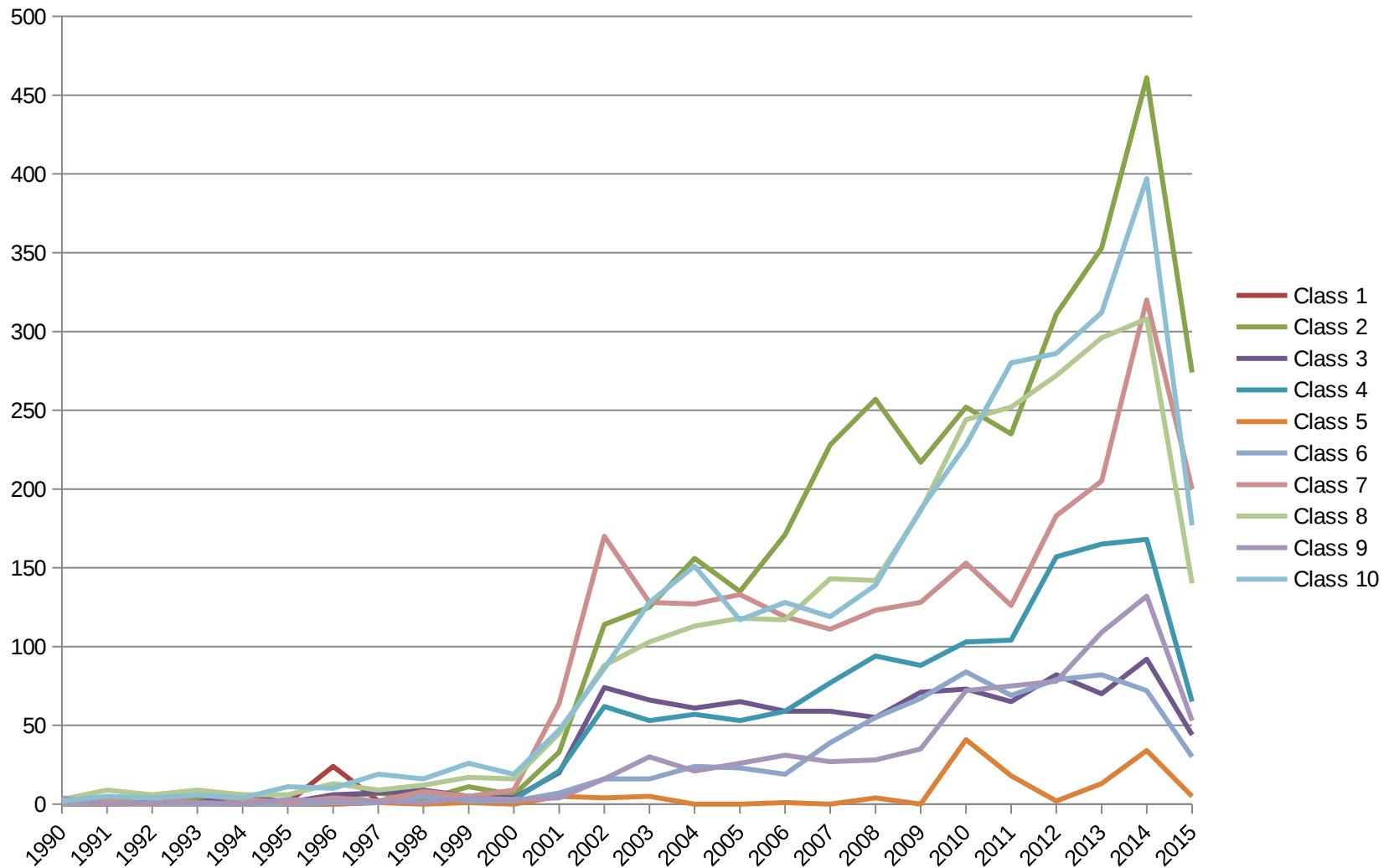
Source: Toivanen & Novotny *Forthcoming*; Teqmine; USPTO

Energiateknologian globaalitrendit



- Source: Bettencourt LMA, Trancik JE, Kaur J (2013) Determinants of the Pace of Global Innovation in Energy Technologies. PLoS ONE 8(10): e67864. doi:10.1371/journal.pone.0067864

BioIT tektologiatrendi





Biotalousden digitalisaatio käytännössä



THE BIOREFINERY OF THE FUTURE

As technology continues to develop, we believe we will see an increase in the variety of feedstocks coming in and products going out of biorefineries. These “Biorefineries of the Future” might use feedstocks such as corn, crop residue, wood chips, methane from landfills and other inputs. Each feedstock could help produce different products, including ethanol, DDGS, carbon dioxide, corn oil, specialty protein, specialty chemicals and biopolymers, among other things.

Some of these capabilities already exist in POET plants, others are in development, and others are still being assessed.

Systems and methods for automated biomass sampling (US2015147797)

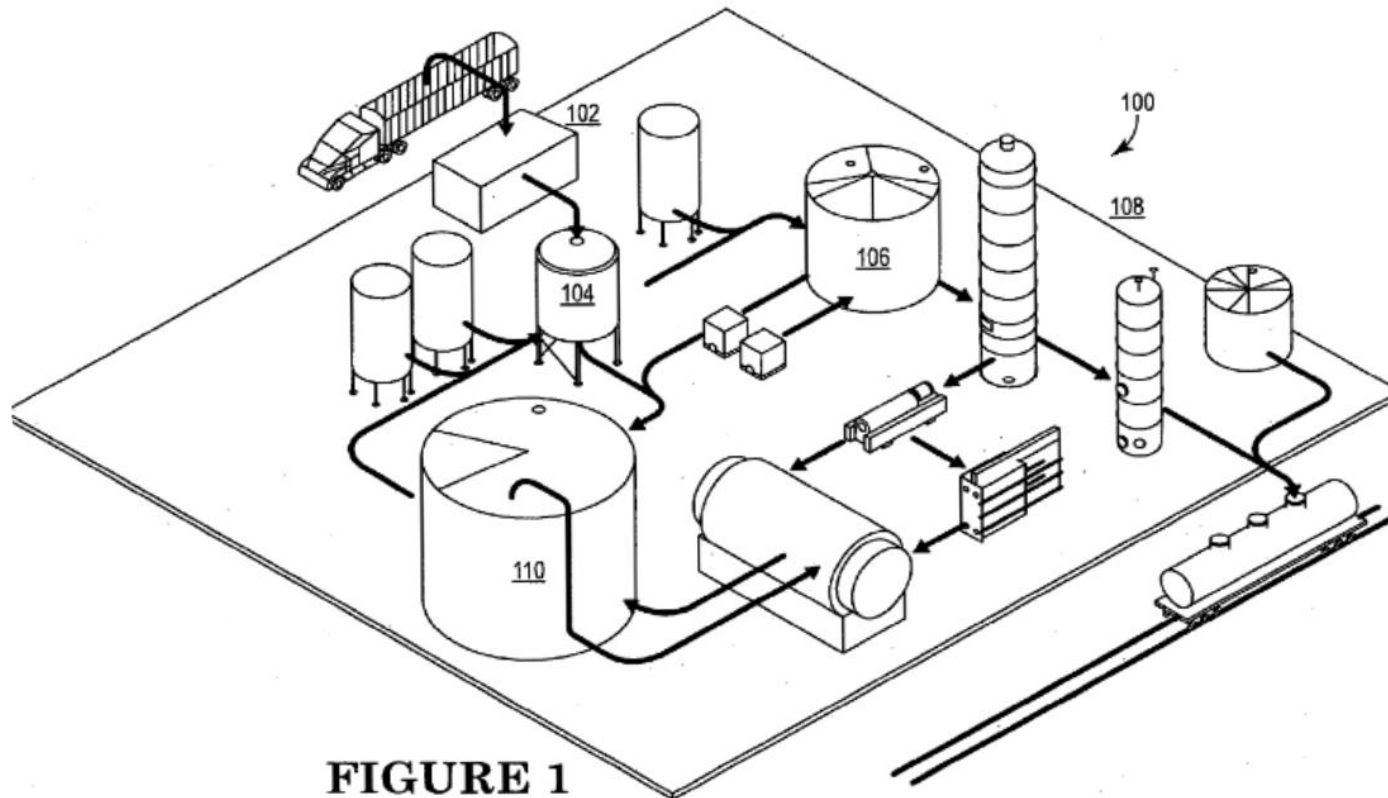
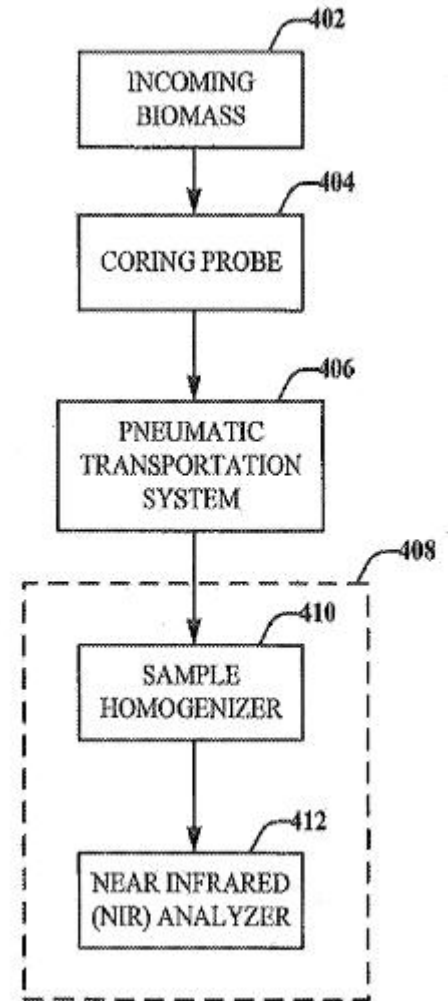
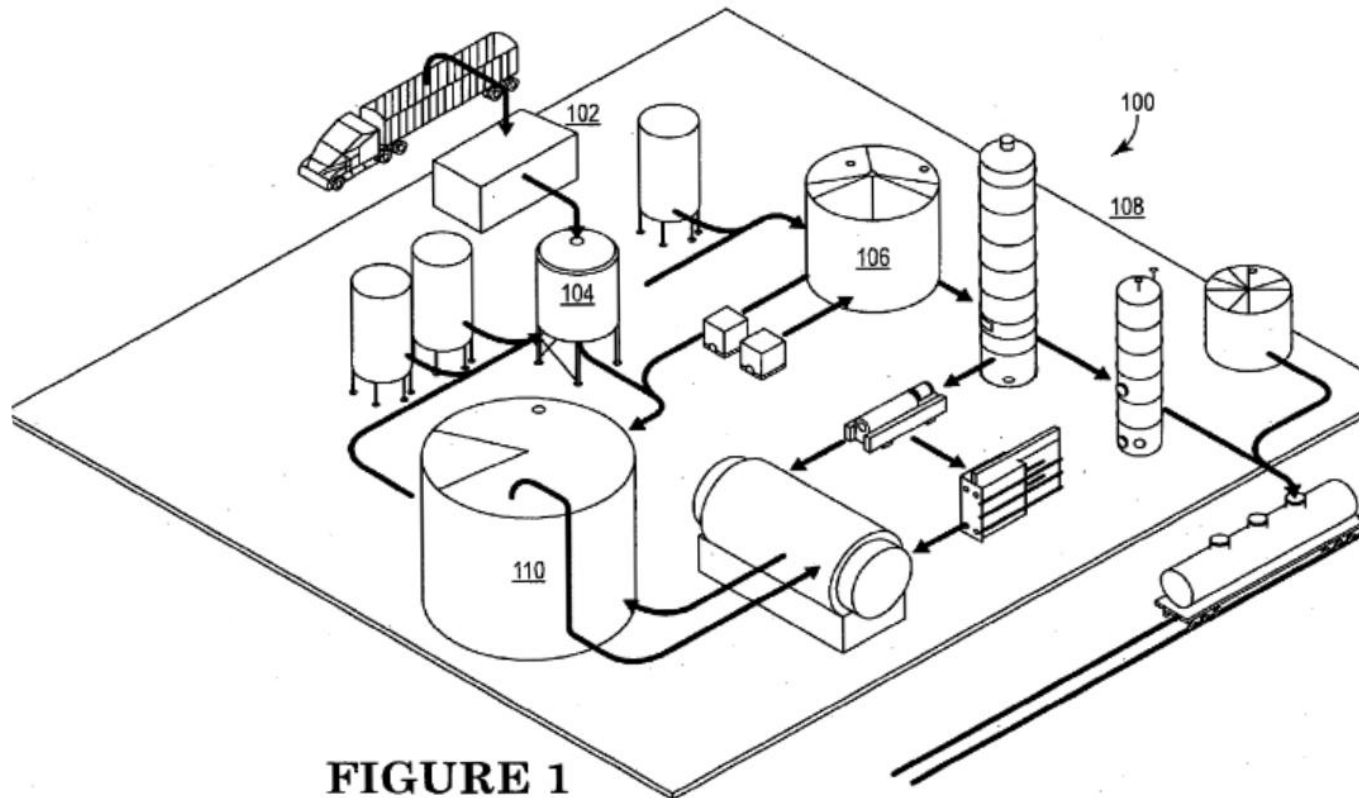


FIGURE 1

Systems and methods for automated biomass sampling (US2015147797)





**WORLD'S FIRST
CLOUD-BASED
MONITORING SYSTEM**



**FIRST ACCELEROMETER
SENSOR LAUNCHED
IN 2005**



**OVER 20 MILLION
COW DAYS RECORDED**

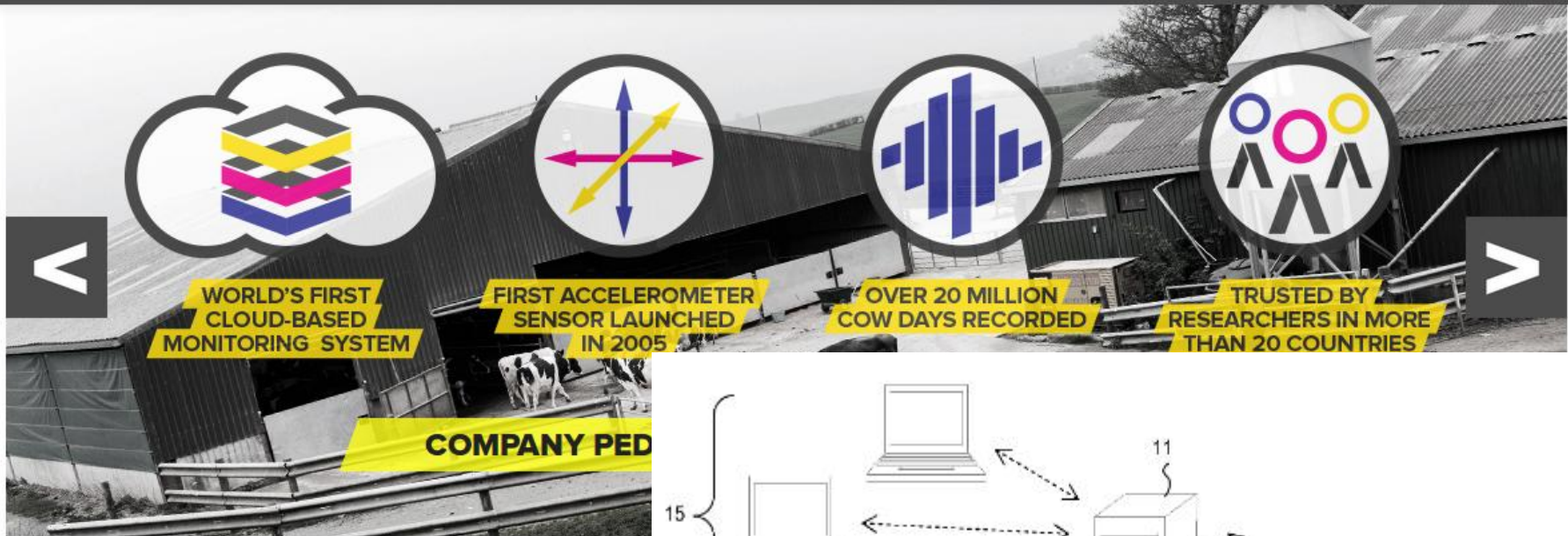


**TRUSTED BY
RESEARCHERS IN MORE
THAN 20 COUNTRIES**

COMPANY PEDIGREE THAT SPEAKS FOR ITSELF

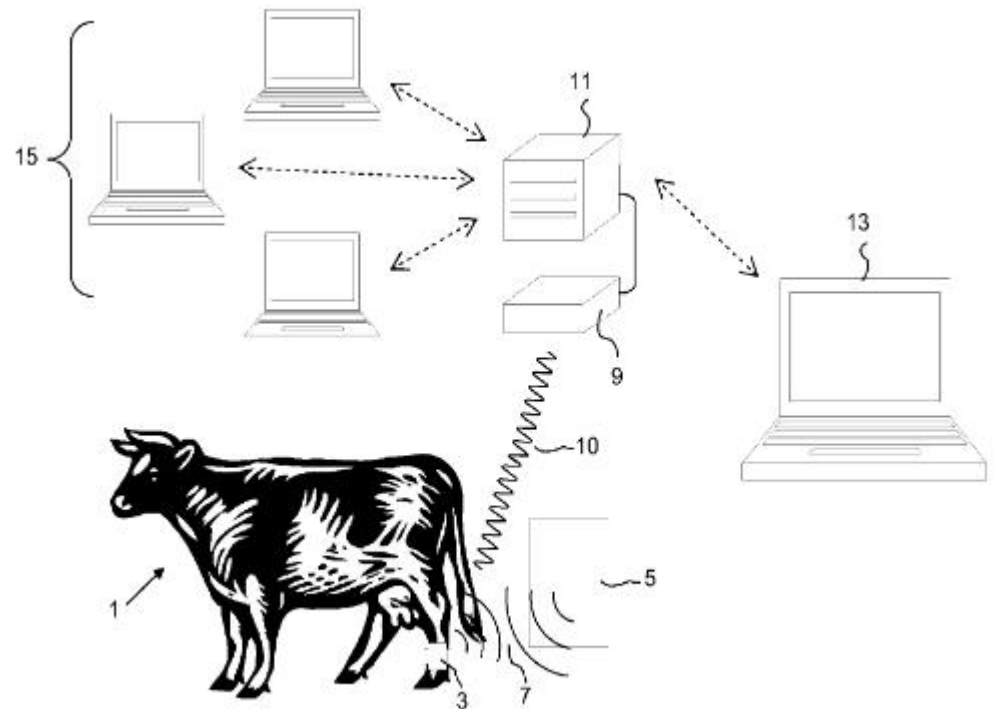
WELCOME TO ICEROBOTICS

IceRobotics is the world's leading developer and provider of data collection and analysis products for monitoring dairy cow behaviour. Our products are trusted by animal behaviour researchers and academic institutions across the world.



WELCO

IceRobotics is the world's leading developer and provider of
are trusted by animal behaviour



Combining Data Science and Biology

We use our patented Computer Assisted Strain Construction and Development Engineering (CASCADE) method to select smart microorganisms from our comprehensive bio-database.



Who we are

CASCADE uses smart microorganisms selected by our patented computer intelligence technology to generate clean energy and other reusable resources from various wastes (solid, liquid, or gas). Our mission is to operate a sustainable, energy effective system of wastewater treatment that reduces costs while also extracting clean energy from the wastewater. We are constantly looking for new sources of renewable energy.



The Problem

About 2.6 billion people (42%) of Earth's population lack access to basic sanitation. Inadequate handling of wastewater has serious consequences for human health, the environment and economy. Wastewater can increase the risk of infectious diseases, and deteroprate groundwater and other local ecosystems. The cost of treating wastewater can be very high and governments often have insufficient resources available for mitigating action.



The Solution

Waste Water Works (WWW) is a sustainable wastewater treatment solution developed at CASCADE. It increases the efficiency of clean energy production (e.g. methane, hydrogen or electricity) from wastewater, while maximizing the efficiency of Microbial Fuel Cell (MFC). Ninety-nine percent of current wastewater treatment facilities do not recover any energy from wastewater, while the remaining 1% only harvest 15% of the total energy stored in the organic waste.



The Future

This represents a \$15 billion market in the U.S., and there is potentially \$60 billion globally addressable by business solutions. Our solutions have the potential to generate \$10 billion of methane or electricity and save another \$10 billion in energy costs in the U.S. alone, while also cleaning dirty water in the process.

Combining Data Science and Biology

We use our patented Computer Assisted Strain Construction and Development Engineering (CASCADE) method to select smart microorganisms from our comprehensive bio-database.



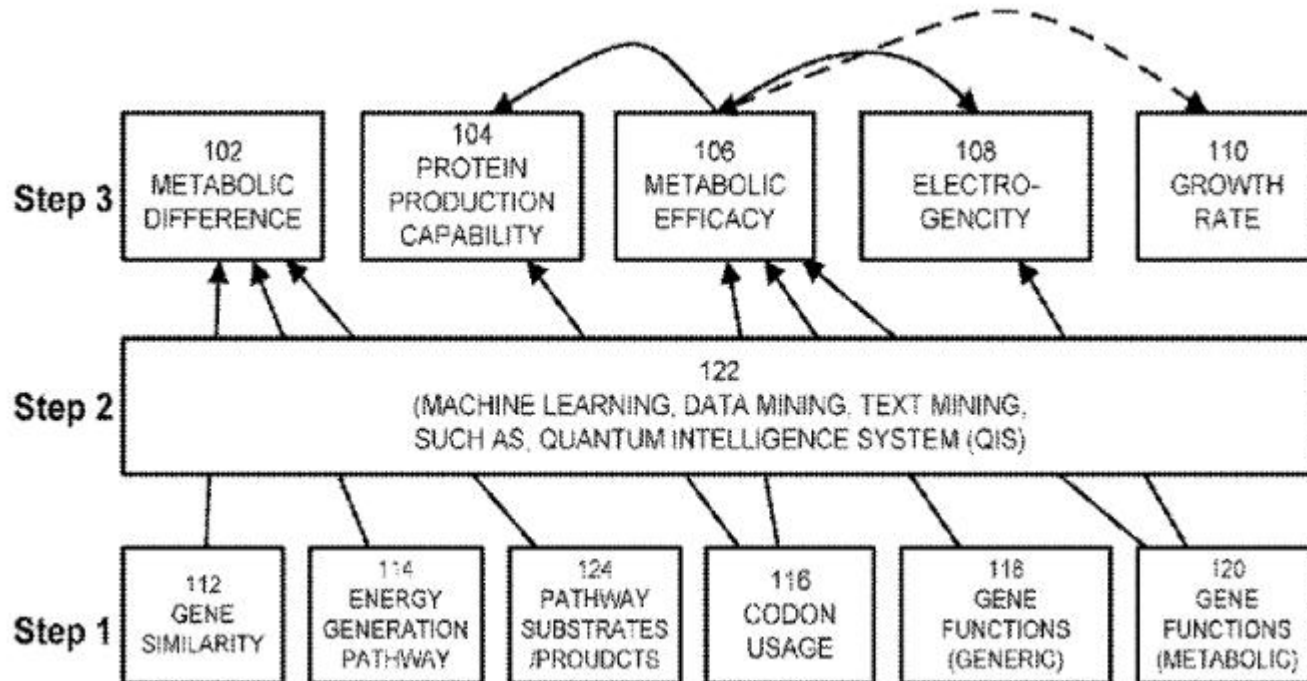
Who v

CASCADE uses smart microorganisms s intelligence technology to generate clear from various wastes (solid, liquid, or gas) energy effective system of wastewater tre extracting clean energy from the wastew sources of renewable energy.



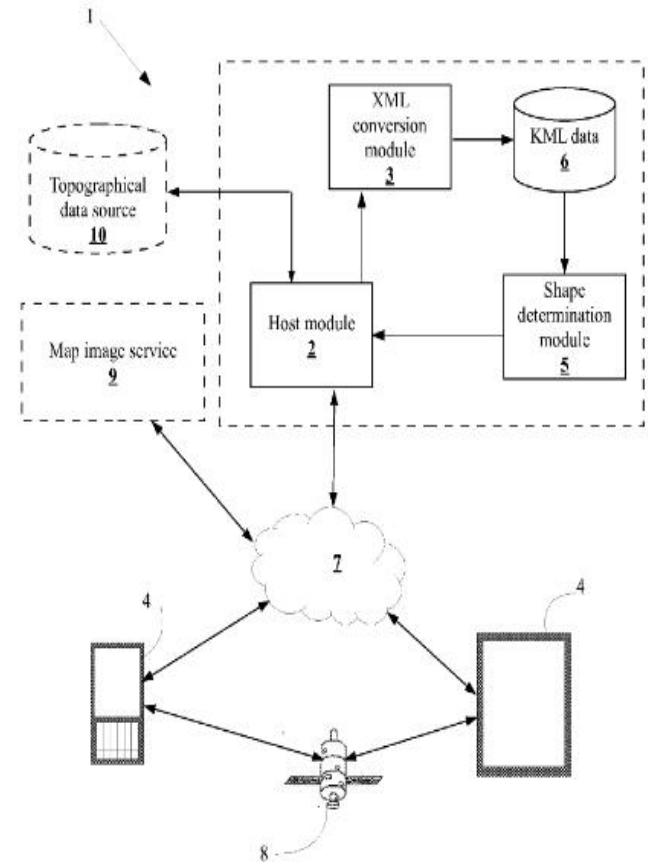
uture

e U.S., and there is potentially \$60 billion ns. Our solutions have the potential to city and save another \$10 billion in cleaning dirty water in the process.



Mihin digitaalisuus keskittyy biotaloudessa

- **Datan ja informaation kerääminen, säilöntä, analysointi ja hyödyntäminen**
- **Digitalisaatio vaikuttaa kautta arvoketjun**
- **Data korostunut rooli: Alustatalous**
 - ”Jos se on ilmaista, sinä olet tuote”
 - Syrjäyttää perinteisiä päättelyn mekanismeja
 - Vaikuttaa arvonluonnin tasapainoon – investointien kohteena ei ole enää koneet ja laitteet, vaan niiden käyttäminen
 - ”Über / Airbnb” liiketoimintamallien mahdollisuudet



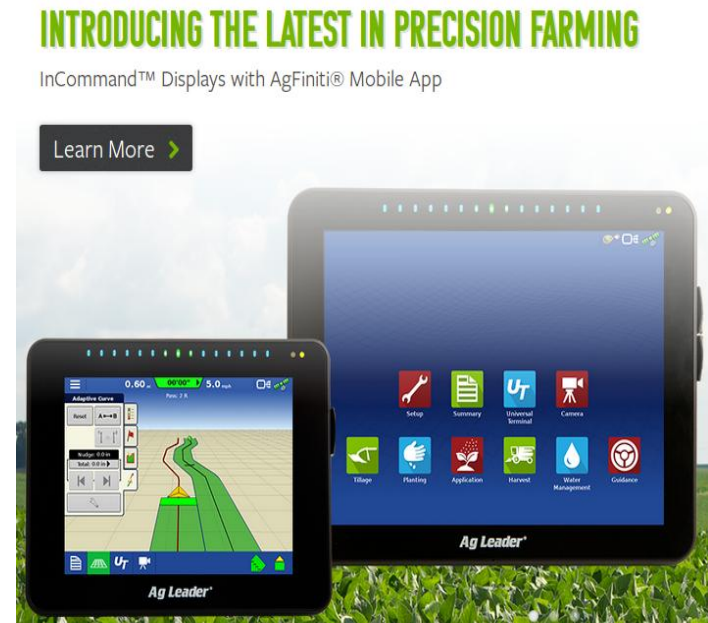
Crop Science | Bayer: Science For A Better Life



Kohti uutta ekosysteemiä

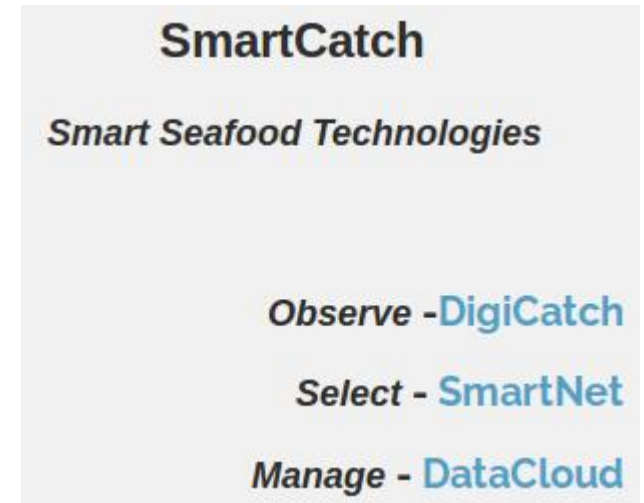
Kohti uutta ekosysteemiä – ja ennen kaikkea uusia innovaatiokäytäntöjä

- **Nopeutetaan reilusti** kaupallistamista ja liiketoimintapotentiaalin toteamista.
- **Mahdollisuuksien luomista**
 - uusille, digitaalisille, toimintatavoille ja liiketoimintamalleille
 - uusille toimijoille
 - vanhojen toimijoiden uusiutumiselle
- **Kyvykkyyksien ja ideoiden nopeaa testaamista ja todentamista**
 - ei ennakko-oletuksia toimittajista (vanhat ja uudet samalle viivalle)
 - alennetaan oppimisen ja kokeilemisen kustannuksia



Kohti uutta ekosysteemiä – ja ennen kaikkea uusia innovaatiokäytäntöjä

- Toimintatavat → nopeutetaan markkinoille tuomista
 - **"Hackaton"** lähestymistapa:
Nopeasti kokeilla uusia ratkaisuja vanhoihin ongelmiin ja haasteisiin
 - **"Incubators"**
 - **"Large firm – Start-up Networks"**
- **Ketkä?** Toimialan uudet ja vanhat toimijat. Suuret ja pienet yritykset.



Kohti uutta ekosysteemiä – Haasteita



Transforming the way the world works

Industries Products Investors Sup

Home > Agric

RainWave Precipitation Monitoring Solution

Water Solutions



Benefits

- Reduce trips to the field
- Eliminate rain gauge reading errors and maintenance
- Make informed decisions on resource deployment
- Understand how much water ran off the field and how much was absorbed into the soil based on intensity reporting

Try RainWave Contour Map Today →

Overview

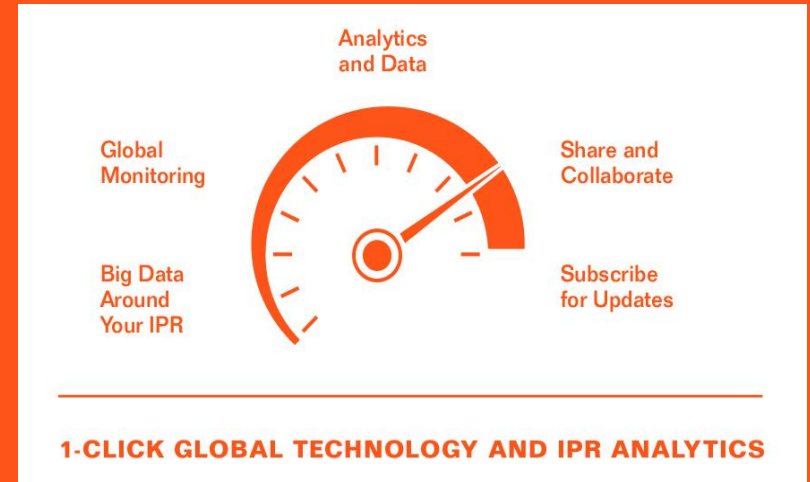
Capabilities

Compatible
Products

The RainWave® precipitation monitoring solution provides you with:

- Biotalousden toimijat suhteellisen vakiintuneita, kiinni olemassaolevissa liiketoimintamalleissa, investoinneissa, tuotantojärjestelmissä
- Digitaalitalouden toimijat – onko riittävä ymmärrys biotalouden toimijoiden liiketoimintaympäristöstä, haasteista ja itse teknologiasta
- Start-up kokeilun ja kehittämisen skaalaaminen tuotannoksi ja laajamittaiseksi liiketoiminnaksi

TEQMINE



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