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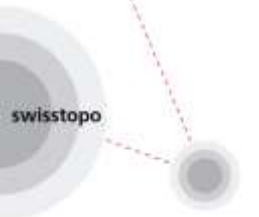
**Presented at the FIG Working Week 2017,
May 29 - June 2, 2017 in Helsinki, Finland**

wissen wohin
savoir où
sapere dove
knowing where

The Land Code

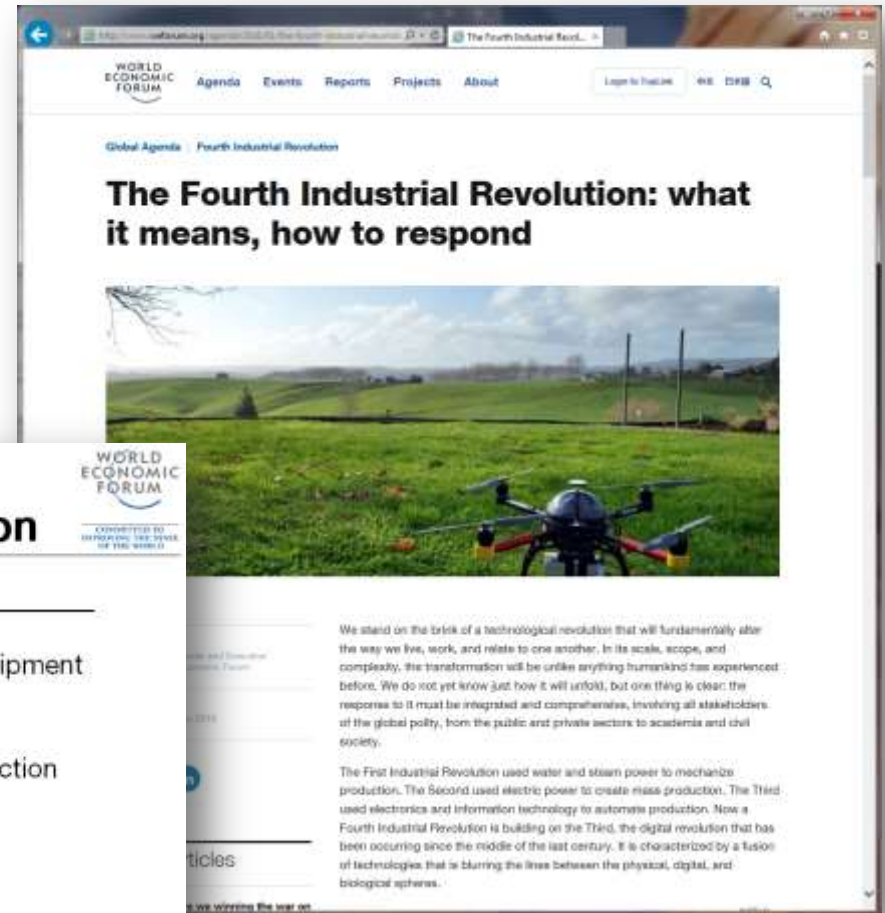
FIG-Working Week 2017
Helsinki, 30 May 2017

Dr. Daniel Steudler









WEF 2016: The Fourth Industrial Revolution



Navigating the next industrial revolution

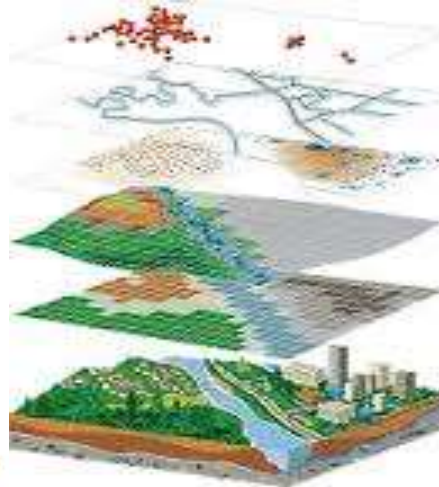
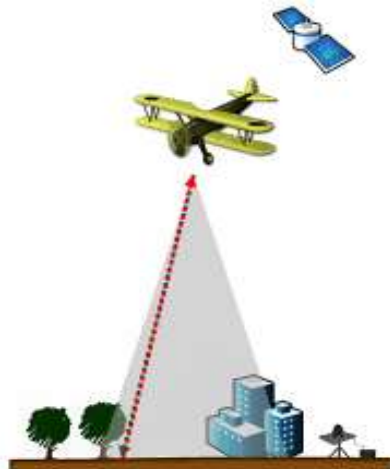
Revolution	Year	Information
	1	1784 Steam, water, mechanical production equipment
	2	1870 Division of labour, electricity, mass production
	3	1969 Electronics, IT, automated production
	4	? Cyber-physical systems



Social and economic context today and tomorrow

Increased participation, closer cooperation between producers and consumers, decentralization:

- sharing economy with sharing platforms: AirBnB, Uber, Wikipedia, car sharing, bike sharing, handicraft web, Tripadvisor, Facebook, Twitter, eBay, booking platforms, OpenStreetMap, etc.
- music industry and bookselling trade did undergo revolutions
- finance sector: Bitcoin, digital transactions, mobile payments (Apple Pay, Android Pay, etc.)
- supply is not happening any longer from a few central supply points, but will be much more decentral with shorter distances and closer contact between suppliers and consumers



1st

2nd

3rd

4th

Triangulation,
Orthogonal
methods

EDM, Photo-
grammetry

GIS,
fully digital
format

"Smart"

The four revolutions in
land information



4th Revolution in Land Administration

What is Land Administration all about?

- ❖ it is about documenting **objects**: land objects
- ❖ it is about **connecting** these objects to other data and information, eg. to rights and people
- ❖ it is about **transactions** that these objects and connections are undergoing

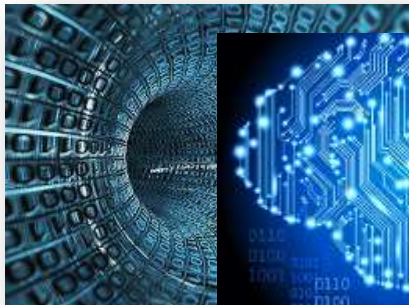
Developments in the "smart" world:

- **Objects** → Big Data, Data Mining, Deep Learning
- **Connections** → Linked Data, Internet of Things, Meta platforms
- **Transactions** → Blockchain technology



Objects – Land Objects

- Sensors everywhere
- Big Data, Data Mining
- Machine Learning, Deep Learning
- Neural Networks
- etc.



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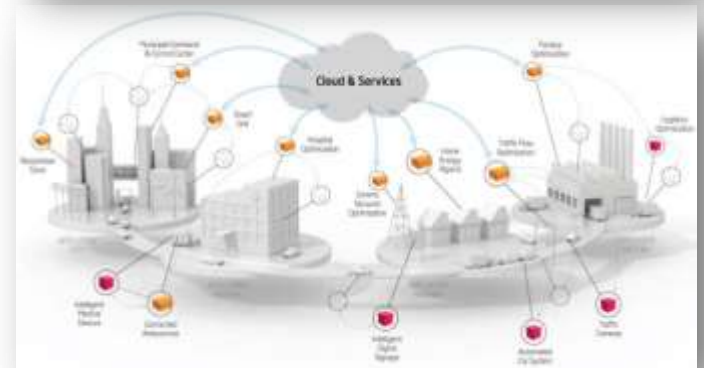
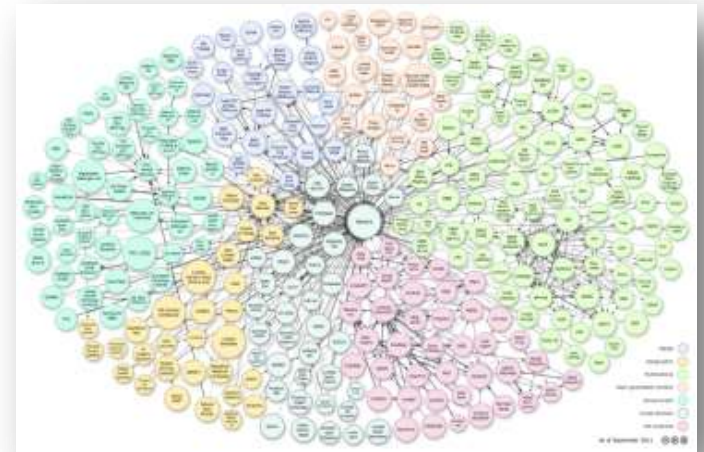


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Connections – Linking Data, Information, and Services

- Linked Data
- Internet of Things
- **Meta platforms** (eg. Google, Apple, Facebook, Amazon, etc.)



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Meta Platforms

Providing products and services on one contextual environment with the same or similar user interfaces.

Existing examples:

- App stores: App Store (iOS), Google Play (Android), Windows Store, etc.
- Map services: Google Maps, Apple Maps, Bing Maps, Here, MapBox, etc.

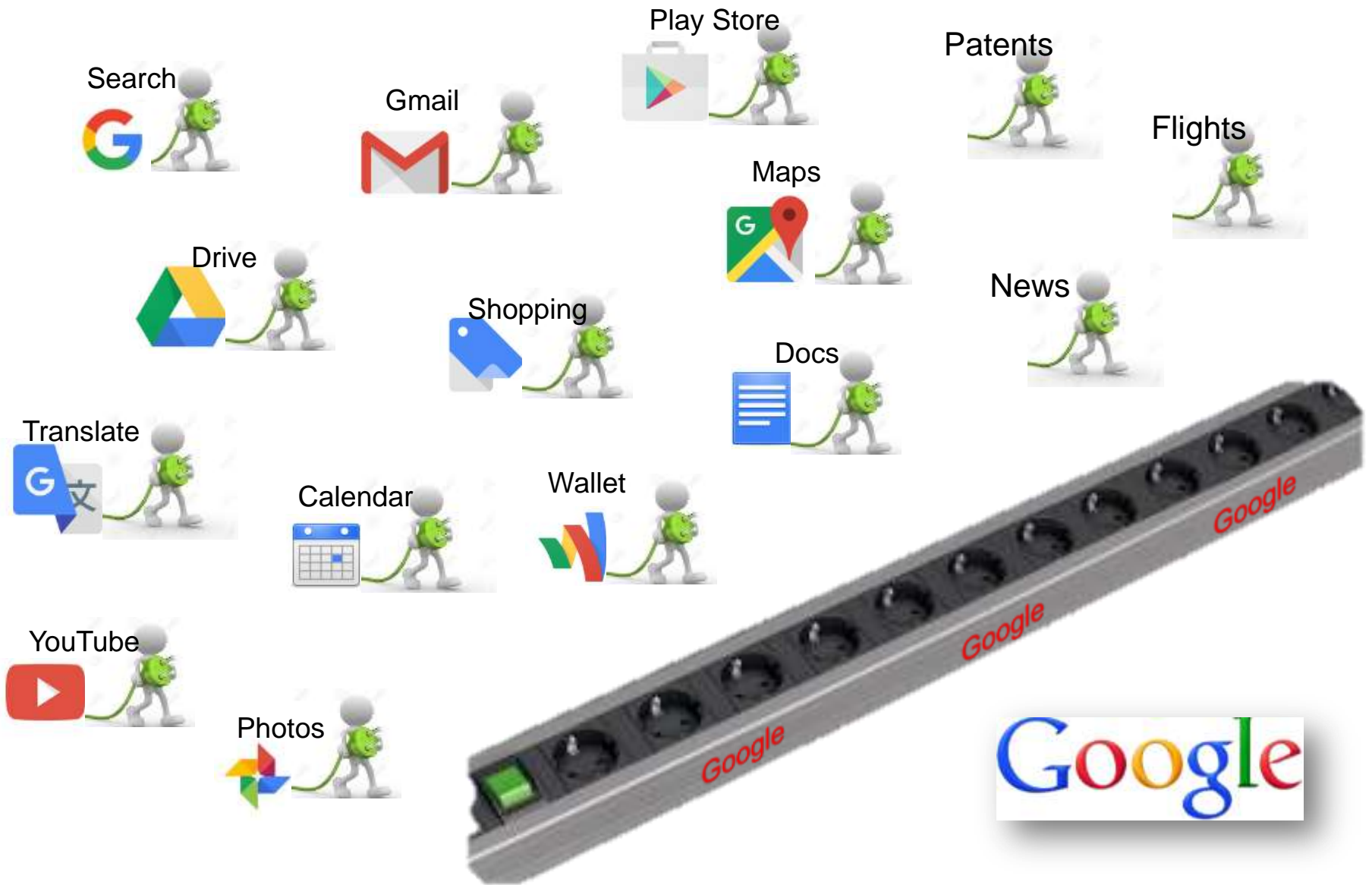
The basic idea is to provide a common platform (with the same look-and-feel), where market participants can "plug-in" their services.

A whole new way of setting up value chains.





Meta Platform – The Google Way

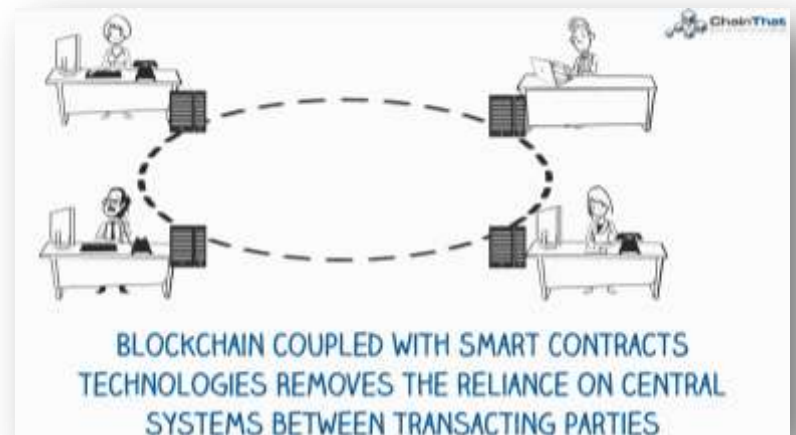




Transactions – Blockchains

Description of Blockchain on Wikipedia.org:

- A blockchain is a distributed database that maintains a continuously growing list of records, called *blocks*, secured from tampering and revision. Each block contains a timestamp and a link to a previous block. By design, blockchains are inherently resistant to modification of the data – once recorded, the data in a block cannot be altered retroactively. Through the use of a peer-to-peer network and a distributed timestamping server, a blockchain database is managed autonomously. Blockchains are "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way.





Areas where Blockchains are or might be applied

- digital currency: Bitcoin / Ethereum
 - sharing platforms: Amazon, etc.
 - airplane industry: management of plane parts
 - car industry: transactions and management of spare parts
 - to protect genuine products from counterfeit products
 - flower auctions: to manage transactions and to proof origin
 - medicine: protection against false medicine
 - container shipments: logistics, customs, deliveries
- **to keep the certificates and transactions secure, to decrease mistakes, and to eliminate corruption in business processes**

Features:

- trust is placed on a distributed/decentralized system
- transactions can be monitored by all
- no central system or institution is required



Examples of blockchain in land administration

Sweden

- potential risk of a central register → central point of failure
- in the digital age, trust may be shifting from central DBs to decentralized systems

Georgia

- long and complex process involving many agencies, undetermined parcel boundaries, disputes, court decisions, delays due to flawed title documents
- blockchain is tamper-proof with verifiable transactions
- sharp increase in registration numbers, growing interest of citizens

Ghana

- Bitland project with Cadastrals



Conclusions

- it will not be us documenting the land in the future, the land is documenting itself through sensors, smart devices, etc., all creating computational code;
- legitimate needs and the law might be derived from such codes and implemented in administrative services of the future;
- Code + Algorithms → **The Land Code**
- future role of governments would be to provide platforms that are open to the establishment of (computational) land codes;
- the different stakeholders and parties of land management can then "plug in" into such meta platforms.