



Interoperability and the use of public data for evidence-based policymaking

DR OTT VELSBURG, GOVERNMENT CHIEF DATA OFFICER

Estonia has entered the post-digital era.

Digitization is no longer a competitive advantage.

The conscious use and management of data and artificial intelligence will lead the way.

Digitization
2000 – 2010

e-State

Simple services that increased the efficiency of the public sector. In essence, digital services followed the operating mechanisms and logic of non-digital services.

Digital society
2010 – 2020

Digital State

The spread of digital services and the emergence of a data society. Digital services are usually better than their non-digital counterparts.

Post-digital era
2020 – ...

Agentic State

A completely new type of service without a non-digital counterpart. Creating personalized services using the possibilities of data economy and artificial intelligence.

WE
ARE
HERE

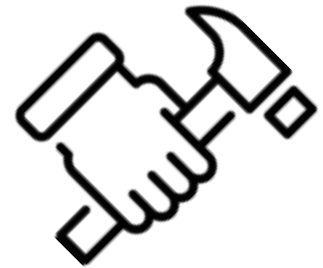
Agentic AI: The Hands and the Brain

Agentic AI means...



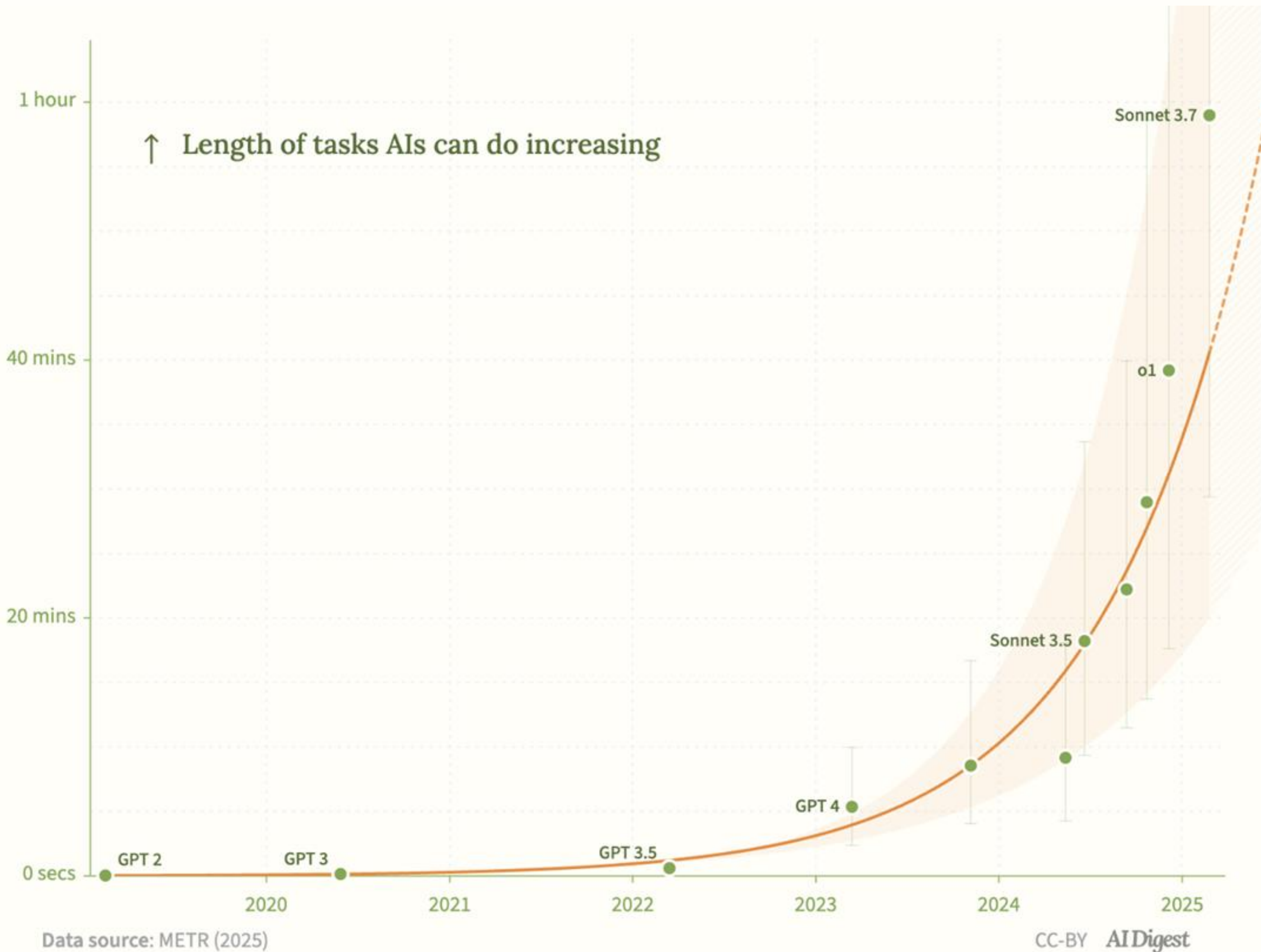
LLMs and other learning models

applied to



tool use and workflows

so that software perceives, reasons, and acts with minimal human intervention to achieve defined outcomes.



March 27th, 2025

A new Moore's Law for AI agents

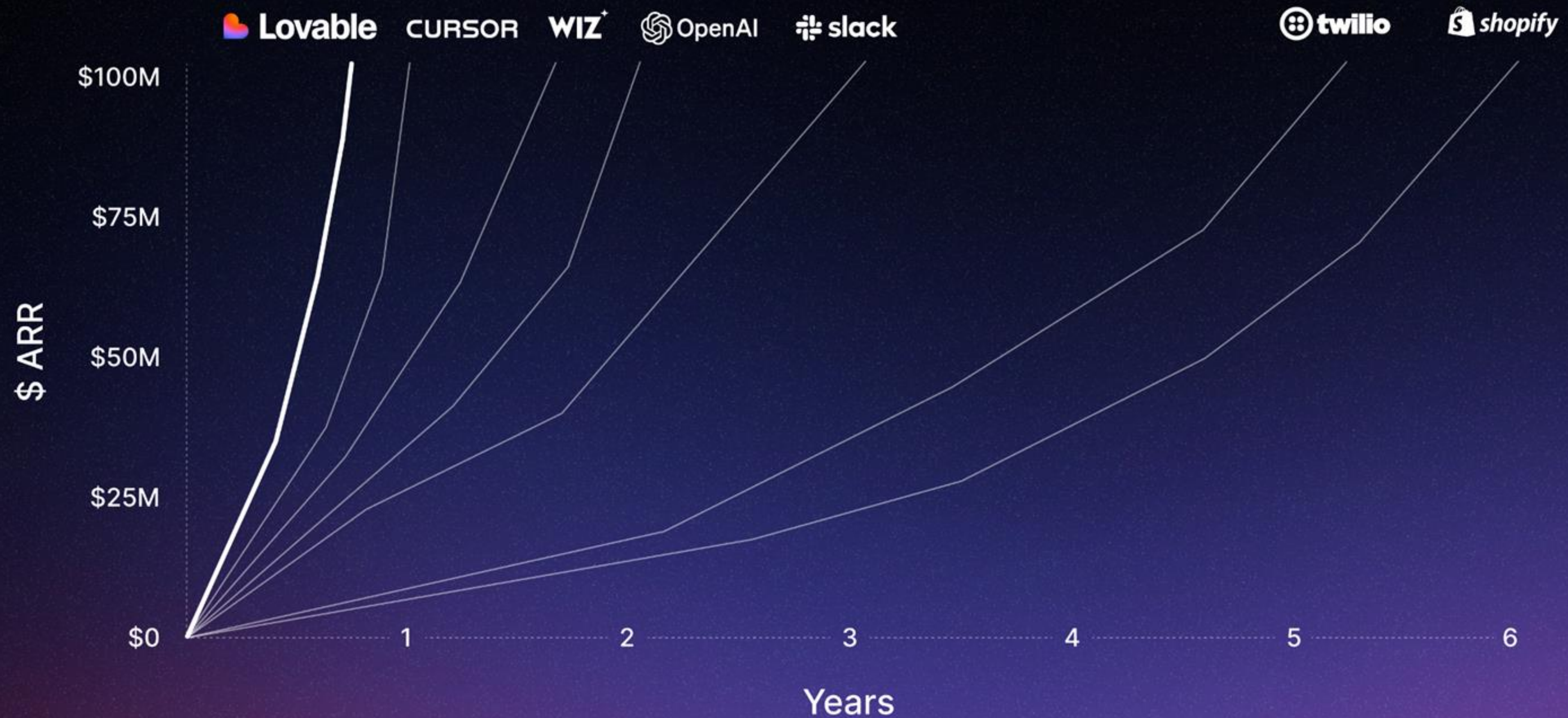
When ChatGPT came out in 2022, it could do 30 second coding tasks.

Today, AI agents can autonomously do coding tasks that take humans an hour.

Scroll to continue



Fastest \$1M → \$100M



People are creating cool things:

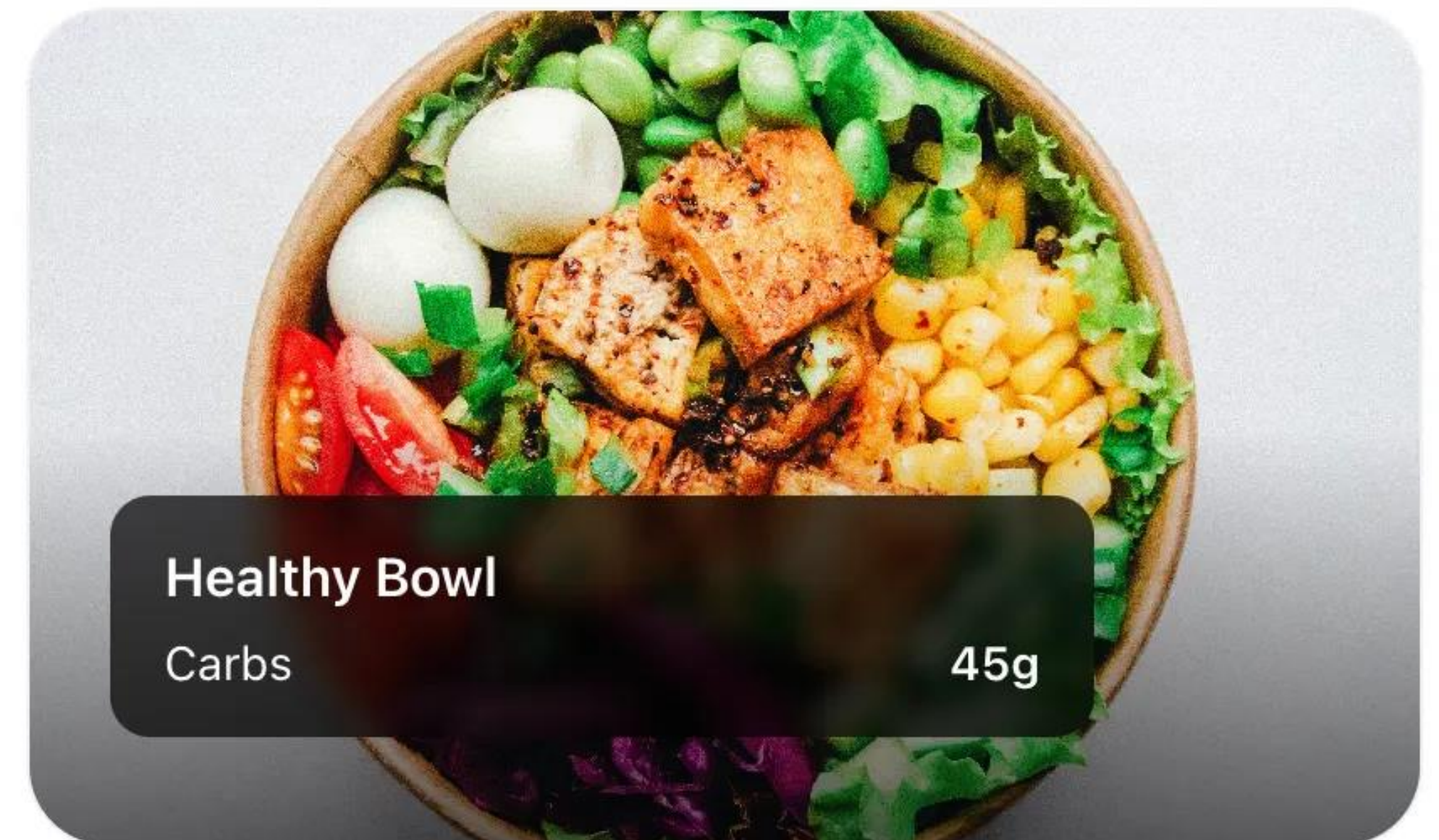
People are creating cool things:



→] Login

Know Your Carbs in a Snap

Take a photo. Get instant carb insights. Smarter choices start here.



 Take a Photo

 Choose from gallery

People are creating c

How many layers should I wear today?

Where are you today?

Find

Now 🌙

1



T-shirt weather



Weather in Your location

68.2°F

°C/°F

High: 68.2°F

Low: 69.4°F

Upcoming 6 hours • Windy 🌬️

📱 iPhone shortcuts ▾

📦 Packing?

📬 Feedback

📁 Choose from gallery

Peo

Track your matches, see your progress

Simple, but powerful tools for lightning fast match-tracking and personal stats.
See how you're doing over time and analyze your match history with AI.

Who is my best doubles partner?

You've played doubles with several different partners winning a total of 37 times but you've won 22 of those with Bill Bell. Based on your match history, Bill seems to be your best doubles partner.

Type your message...



Analyze with AI

Chat with AI to analyze your match history and stats



Progress Tracking

Your Progress score helps you visualize personal growth over time

1.77 Win / Loss Ratio
27 wins, 21 losses

Win/Loss Ratio

Log your matches and we'll automatically calculate your win/loss ratio

⚡ Current streak: 6

Win Streak

Keep track of your current and longest win streaks



Activity Graph

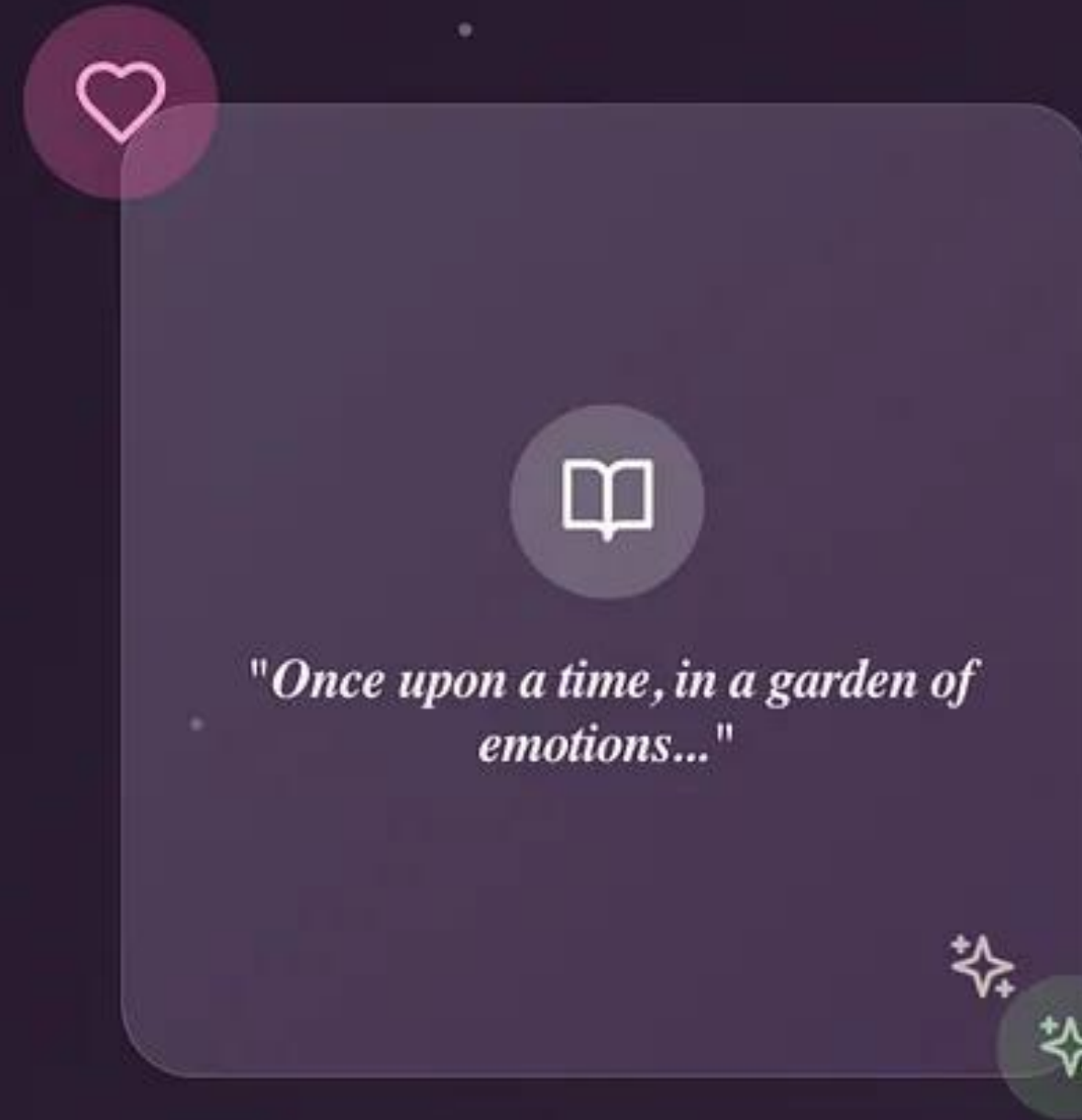
View your daily activity throughout the entire year in a beautiful graph

Bedtime Stories That Grow With Your Child

Create magical, personalized bedtime stories that nurture emotional growth and strengthen family bonds.

Begin Your Journey →

I Already Have an Account



The Magic of Stories of Life

More than just bedtime stories - a journey of emotional growth and connection



AI-Powered Storytelling

Create personalized bedtime stories that



Emotional Growth Tracking

Watch your child's emotional growth bloom



Healing Connections

One special bedtime story helps you and

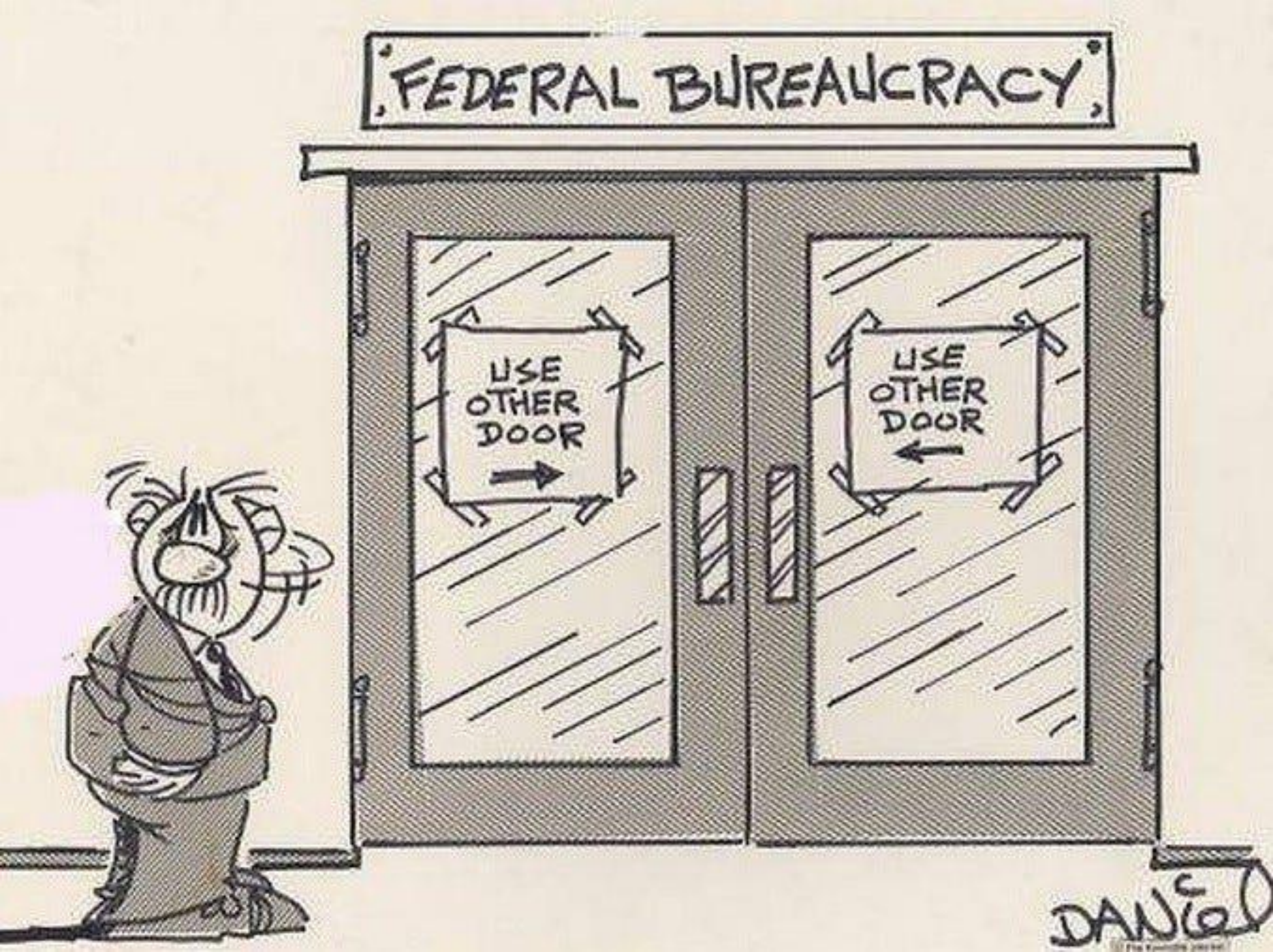


*What if 1% of teachers, students, doctors,
scientists, journalists, parents,
entrepreneurs...*

... built useful new software ...

... each month of 2026?

Government is broken...



Case in point: environmental law, permitting - cost is a real backlash, red tape

Briefing | The war on red tape

Many governments talk about cutting regulation but few manage to

Yet radical deregulation is often a big boost to growth

Save

Share



15 minute building permit

News

World's first AI-Powered Building Permit System launched in Qatar, cuts approval time to 120 minutes

Adijata Ziga · October 26, 2025 · 3 minute read



In Ukraine

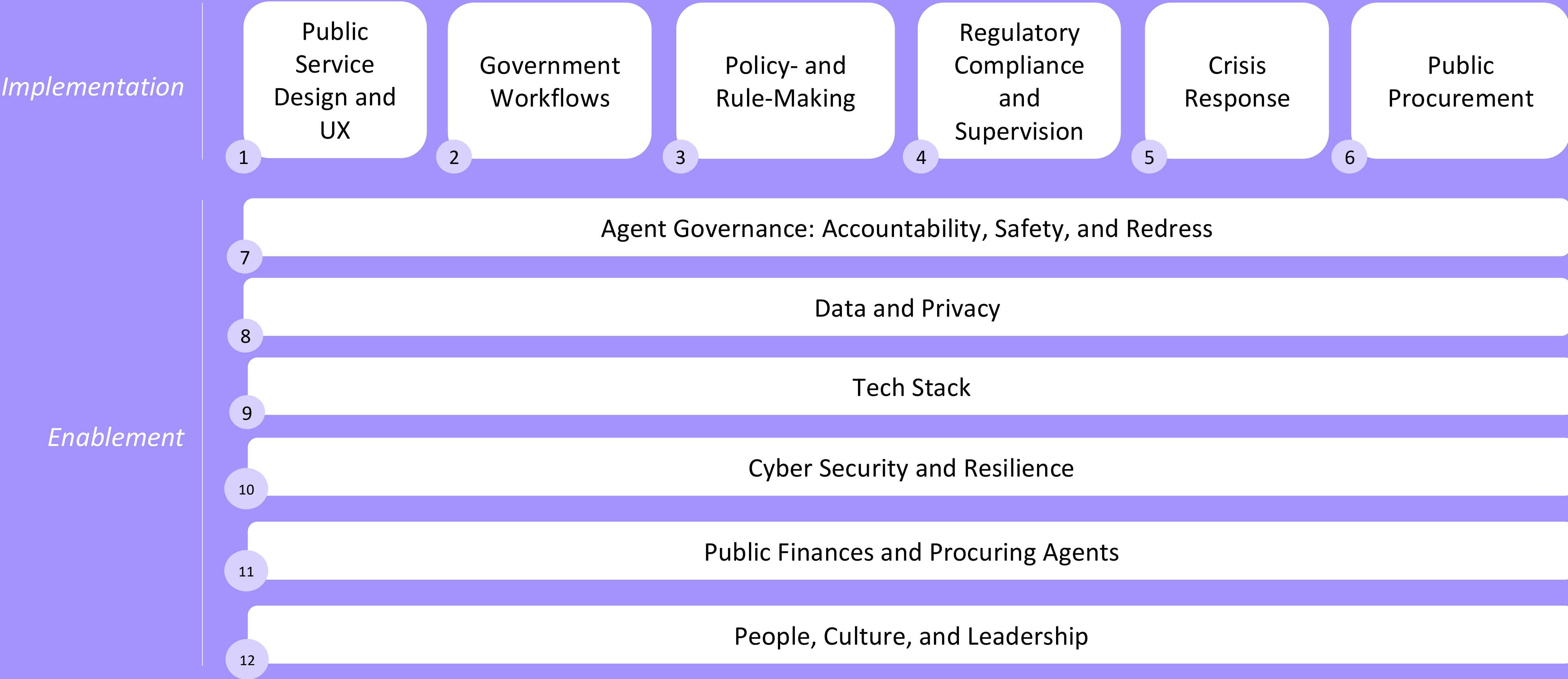
Building permits in 15 minutes: construction documents from individuals will begin to be considered automatically in ASNs

16:55, FEBRUARY 6, 2025



In Ukraine, the processing of construction documents is being accelerated: instead of 10 days, it is now 15 minutes.

The Architecture for the Agentive State



Understanding Levels of Automation

Level of Automation

Cars (SAE)

0: Manual (Human-only)

Manual driving; no assistance.

1: Rule-based automation

Basic cruise control.

2: Intelligent process automation

Dynamic cruise control,
lane holding.

3: Agentic workflows

Highway auto-nav; human
handles edge cases.

4: Semi-autonomous agents

Self-driving operates autonomously
in specific conditions.

5: Fully autonomous agents

Fully autonomous cars drive
anywhere in all conditions.

Understanding Levels of Automation

Level of Automation	Cars (SAE)	Applied to Government
0: Manual (Human-only)	Manual driving; no assistance.	Case officer recommends programme based on experience, guidelines.
1: Rule-based automation	Basic cruise control.	System auto-matches citizens to social programs by eligibility/demographics.
2: Intelligent process automation	Dynamic cruise control, lane holding.	Model predicts best programme, assists with next steps.
3: Agentic workflows	Highway auto-nav; human handles edge cases.	AI handles routine benefit applications end-to-end; human handles edge cases.
4: Semi-autonomous agents	Self-driving operates autonomously in specific conditions.	Agents manage benefits on behalf of all applicants, humans set boundaries.
5: Fully autonomous agents	Fully autonomous cars drive anywhere in all conditions.	System autonomously manages full benefits lifecycle and adjusts policies.

The KPIs of the Agentic State

<i>Metric</i>	<i>Target Indicator or Change</i>
Time to complete most end-user digital services	1 minute
Time to launch new digital services	1 day
User satisfaction with public services	> 90%
% of needs resolved without human intervention	95% of single-interaction requests

In US and EU two-thirds of current jobs, i.e. 300 mn full-time jobs are exposed to automation by generative AI (Goldman Sachs, March, 2023)

Half of Estonians use AI daily. Over quarter of the workforce use AI at work, 45% of executives.

31% of workforce use AI to replace various tasks at work, 67% believe AI increases their productivity, 50% have seen how they work change.

35% of people believe that their work could be replaced by AI, of whom, only 2% believe their work could be replaced completely. 1/5th are afraid that they will lose their jobs



Prompt: AI has replaced people at work

The world's freest, most self-functioning country, powered by AI that remains under people's control



Data-driven state and economy

Estonia applies data and artificial intelligence in a human-centric, secure and smart way in all sectors and areas of life and supports a future-proof data economy.

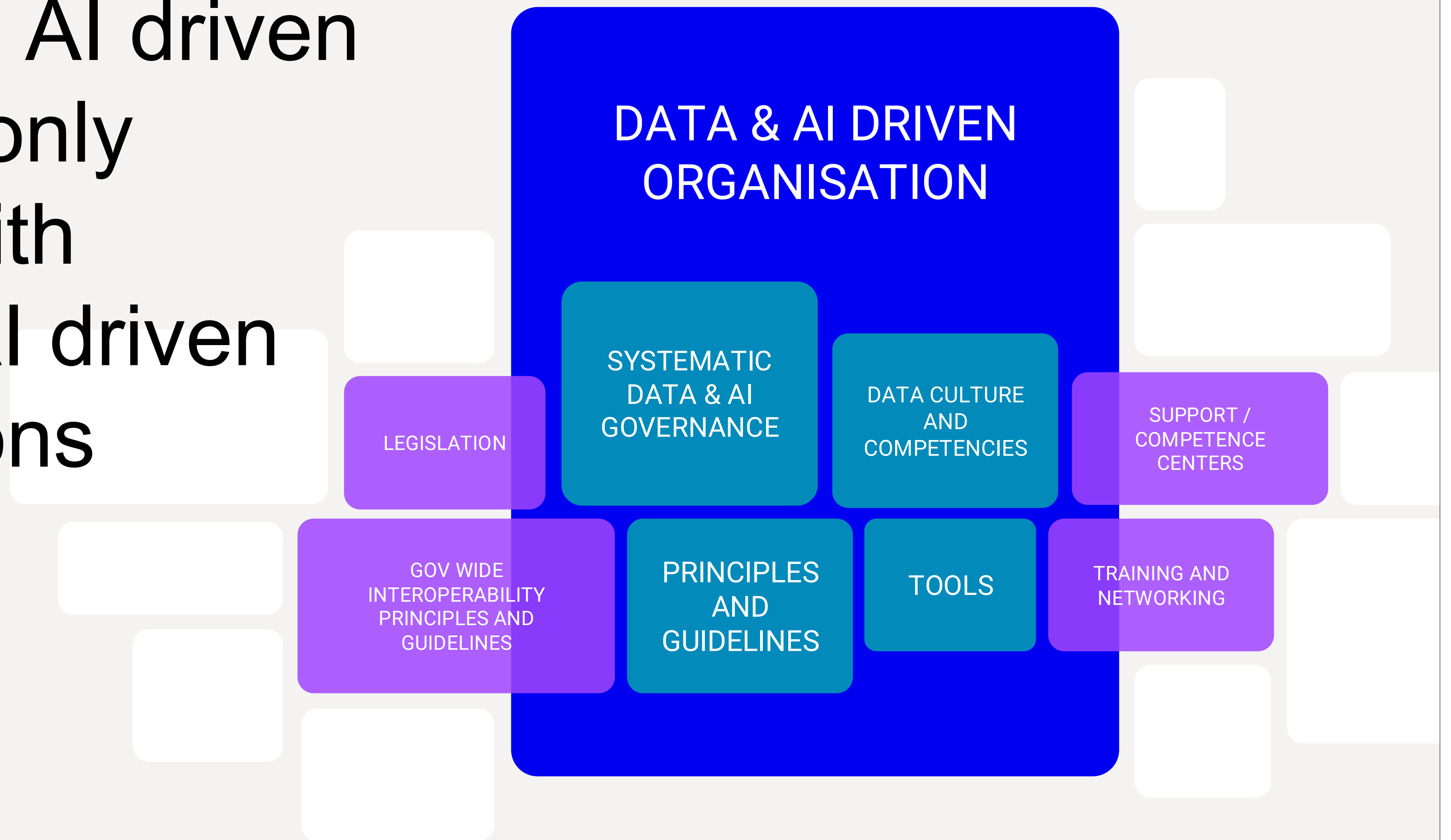
AI driven state and economy

Estonia is a leading implementer of AI in the world, with an on-site infrastructure for the secure processing of AI and data. AI is used systematically and intelligently in every area of life so that control over AI and data is in the hands of people themselves and the survival of the Estonian language and culture is ensured.

Trustworthy, human-centric AI and data governance

The Estonian digital state's data management and use of artificial intelligence are human-centered, reliable, and transparent. This makes us a leader that clearly distinguishes us from other countries in the world. A person can always ask how a decision made about them, for example, using artificial intelligence, was made.

A data and AI driven country is only possible with data and AI driven organisations



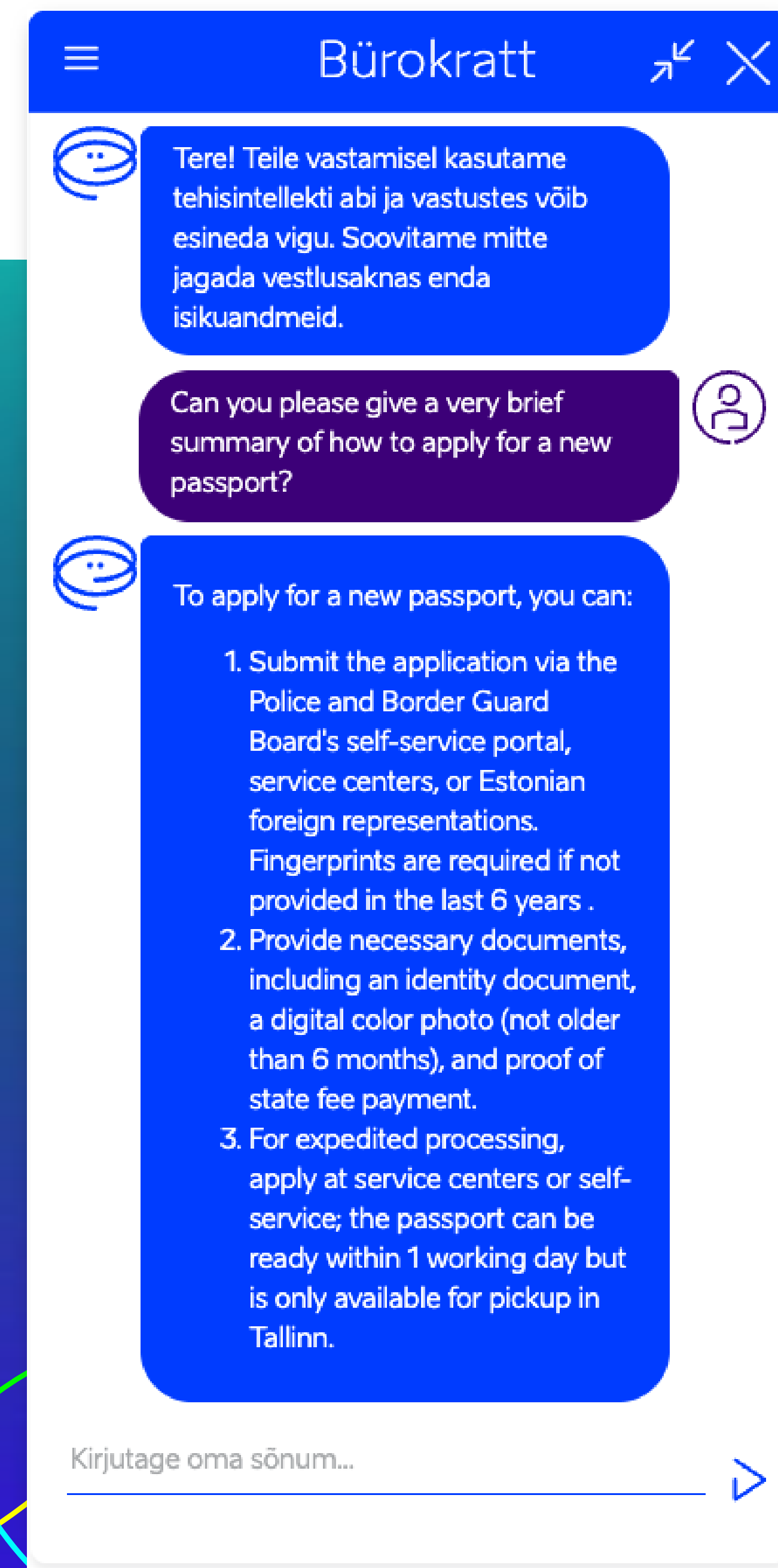


BÜROKRATT:

Network of sovereign chatbots that feels like a single assistant

Estonia is developing a privacy-focused and **decentralized artificial intelligence network** that transforms the way people interact with the government.

This innovative approach not only gives individuals greater control over their data and enables smoother cooperation between government agencies, but also strengthens digital **sovereignty** by relying on **open-source technologies** and maintaining the flexibility to change large language model providers when needed.



"Lawyer Helps" is a website of the Ministry of Justice and Digital Affairs, managed by our contractual partner, the Estonian Lawyers' Association NGO.

Search

GIVE FEEDBACK

Legal information chatbot – a quick way to legal information

Free legal advice for people with special needs

Ask a lawyer – fast and reliable legal advice

Legal aid information days for the elderly

Family (213)

Here you will find the necessary information about marriage, divorce, and property relations between spouses. Also information on how to apply for...
[Read more](#)

Going to court (109)

Here you will find the necessary information about the Estonian judicial system and court levels, as well as instructions on how to go to court if necessary...
[Read more](#)

Debts (155)

Here you will find necessary information on debt-related topics. For example, if legal or enforcement proceedings have been initiated due to debt, or...
[Read more](#)

Cross-border business (66)

Here you will find various information on cross-border business...

Real estate and property law (118)

Here you will find various information on real estate and property law...

Document forms (37)

Here you will find various information on document forms...

Bureaucrat

Hello! I am a chatbot based on artificial intelligence and I will help you with simple legal questions. I do not replace a lawyer. Before starting a conversation, please read [the instructions for use](#) . Do not share personal information in the chat window.

Detecting tax fraudsters



Challenge:

- Rule-based system (developed for 10+ years) was hard to maintain and improve
- Intuition that a lot of potential was hidden in the data

Solution:

- AI increased the accuracy by 59% compared to the previous rule-based system, achieving an accuracy of 97%
- Human-in-the-loop system learning from expert auditors



8 11 C 30.42 inHg TRAILCAM15

Assessment of game population density



TRAILCAM24 05/12/2018 10:06AM



8 26 C 29.91 inHg TRAILCAM09

05/23/2019 07:10PM

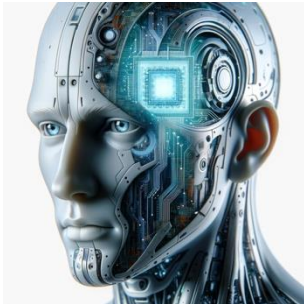
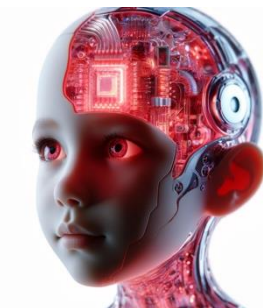
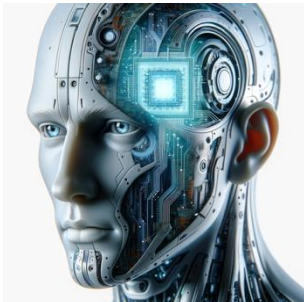


8 23 C 30.0 inHg TRAILCAM21

05/21/2019 09:34AM



Machine learning, applied statistics and AI models we operate today in Estonian Unemployment Fund allows us to rethink our service strategy and operating model

Model	Question	Method	What type
 OTT	How easily does a person find work within 180 or 360 days? What factors influence this?	Decision trees, <i>lightGBM</i> algorithm based <i>gradient boosting</i> 5+ years of data Trade-off between accuracy and interoperability	Machine learning
 MALLE	Do active labor market measures help in finding work? Which are the best? Which are most suitable? Do benefits exceed costs?	Difference between participation and control group, statistical matching and regression analysis Impact up to 3 years after the measure	Applied statistics + machine learning
 OSKAR	What are the most suitable jobs for a person? What training should a person receive?	Language models for finding skills from work experience and job postings Distance calculation between a person's skills and job requirements	AI
 TIINA	What is the impact of longer duration and larger monetary benefits on unemployment duration and subsequent wages?	Comparison of people with different benefit duration and amounts, statistical matching	Applied statistics
 MAITT	Is predicting unemployment risk possible? What is the impact of preventive services on risk?	Decision trees, XGboost based <i>gradient boosting</i>	Machine learning



Mis on isheemilised südamehaigused

Mida tähendab eelsoodumus

Mida tähendab eelsoodumus isheemilistele südamehaigustele

Mida näitab sinu geneetiline risk

Geneetika ja elustiili pikaajaline koosmõju

Personaalsed soovitused

Jaga oma tagasisidet

Valdur Kaldur

Katseta, kuidas andmete muutmine mõjutab graafikul sinu üldriski

Kõrge geenirisk **3.2**

PIKKUS
180 CM

KAAL
90 kg

VÖÖÖMBERMÕÖT
95 cm

Lisainfo

KAS SUIITSETAD

EI

JAH

Muudan

Teist tüüpi diabeedi koguriski mõjutab



suitsetamisest loobumine



kolesterooli langetamine



vererõhu langetamine



kehakaalu langetamine

Kokku on teil võimalik haigestumise riski vähendada **3.5 % → 2.1%**

Vähendada riski haigestuda 70. eluaastaks **10 % → 6.2%**

10a pärast
10% riskitõus

teie praeguste
tervisenäitajate alusel

45a

55a

65a

75a

85a

95a

Wind

Sea level

Seawater temperature 1m

Seawater temperature 3m

Currents

Salinity

[Significant wave height and direction](#)

Observation data

Coastline stations

Dirhami

Haapsalu (port)

Heltermaa

Häädemeeste

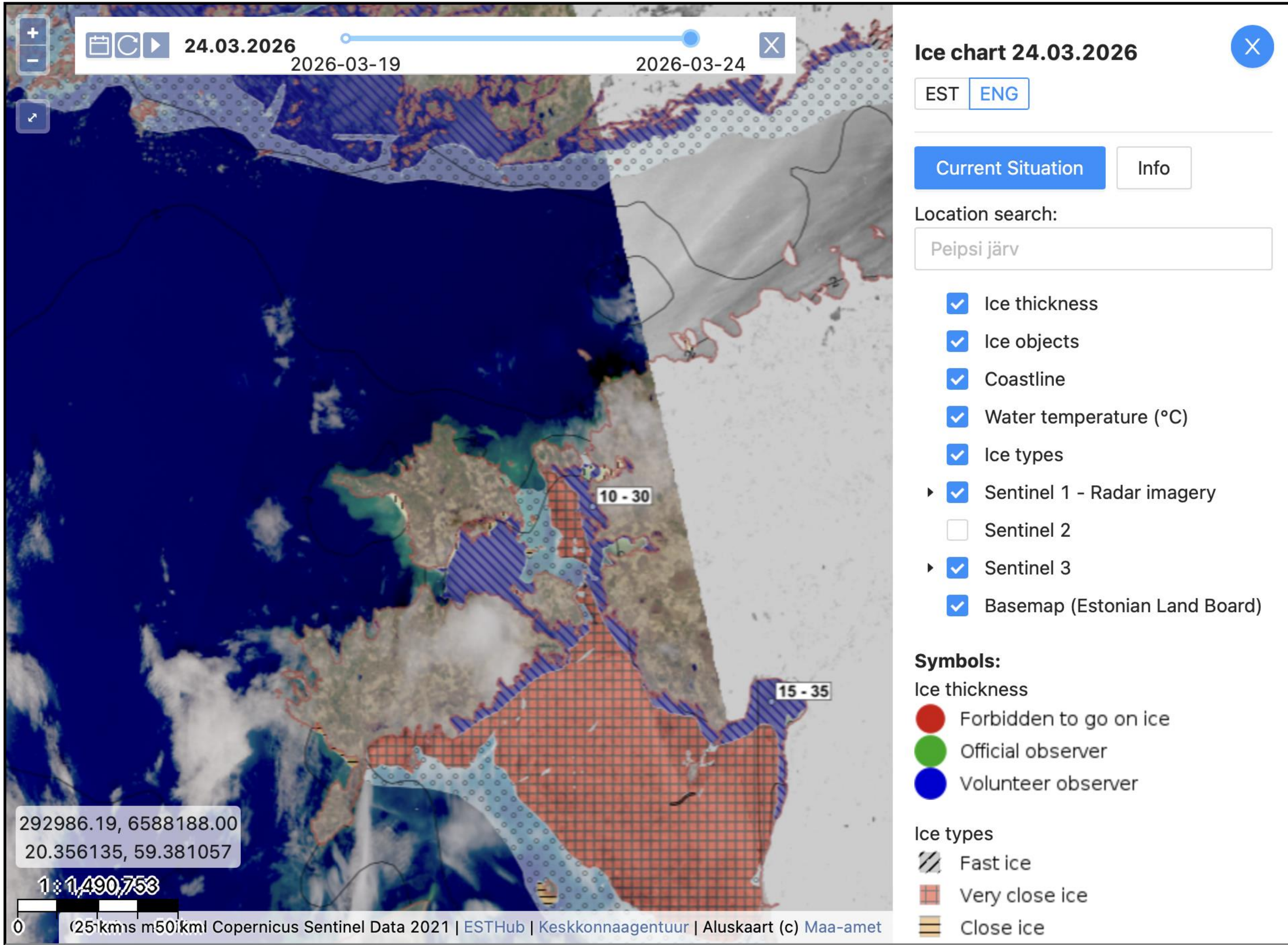
Kunda

Loksa

Mõntu

By clicking the “[Current Situation](#)” button in the upper right corner of the ice map, you can view the latest ice thicknesses of inland waters measured by the Rescue Board. You can also **open the ice map in separate browser window: jaakaart.envir.ee**

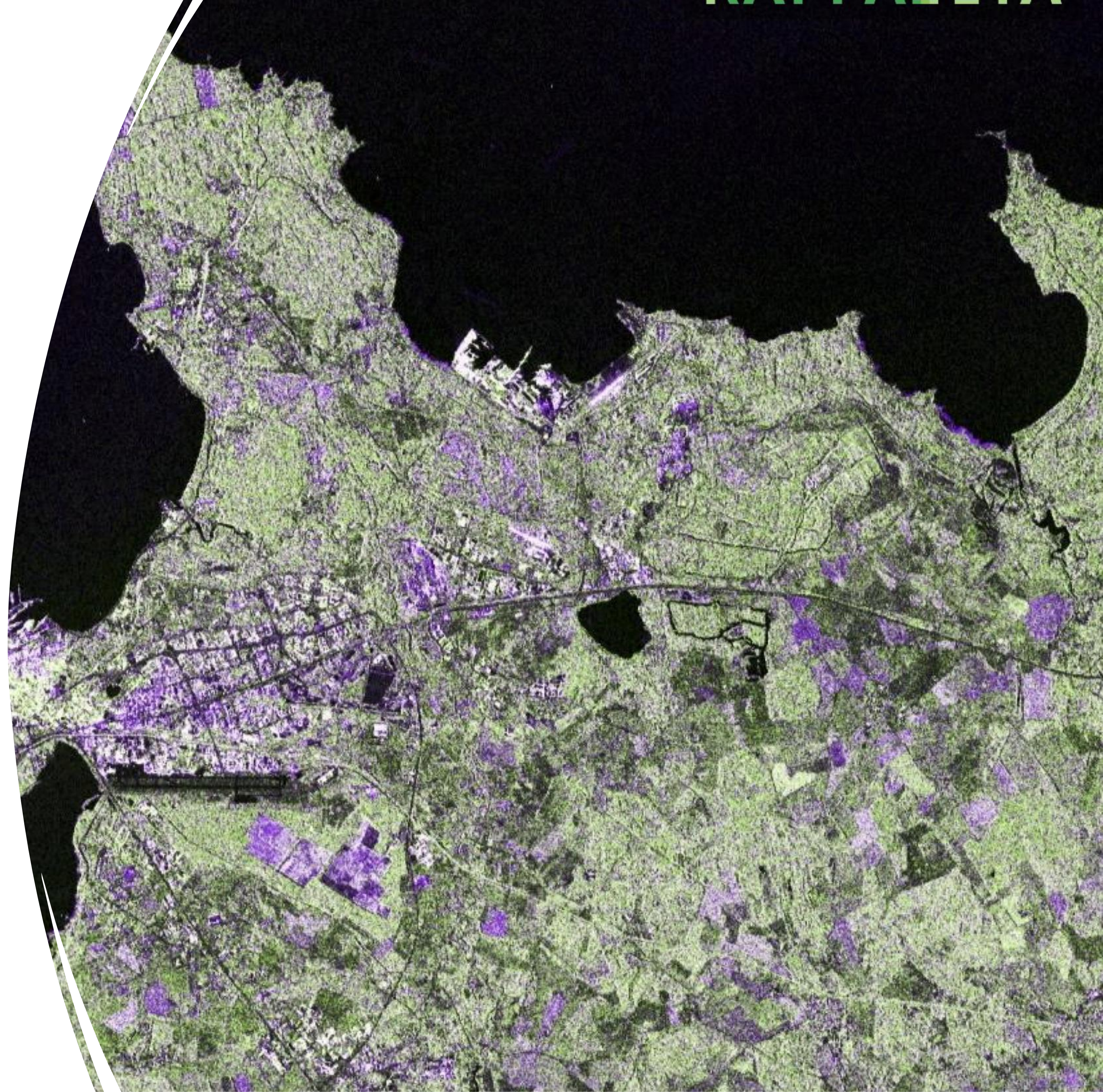
In the summer the satellite images of the application can be used to monitor Cyanobacteria.



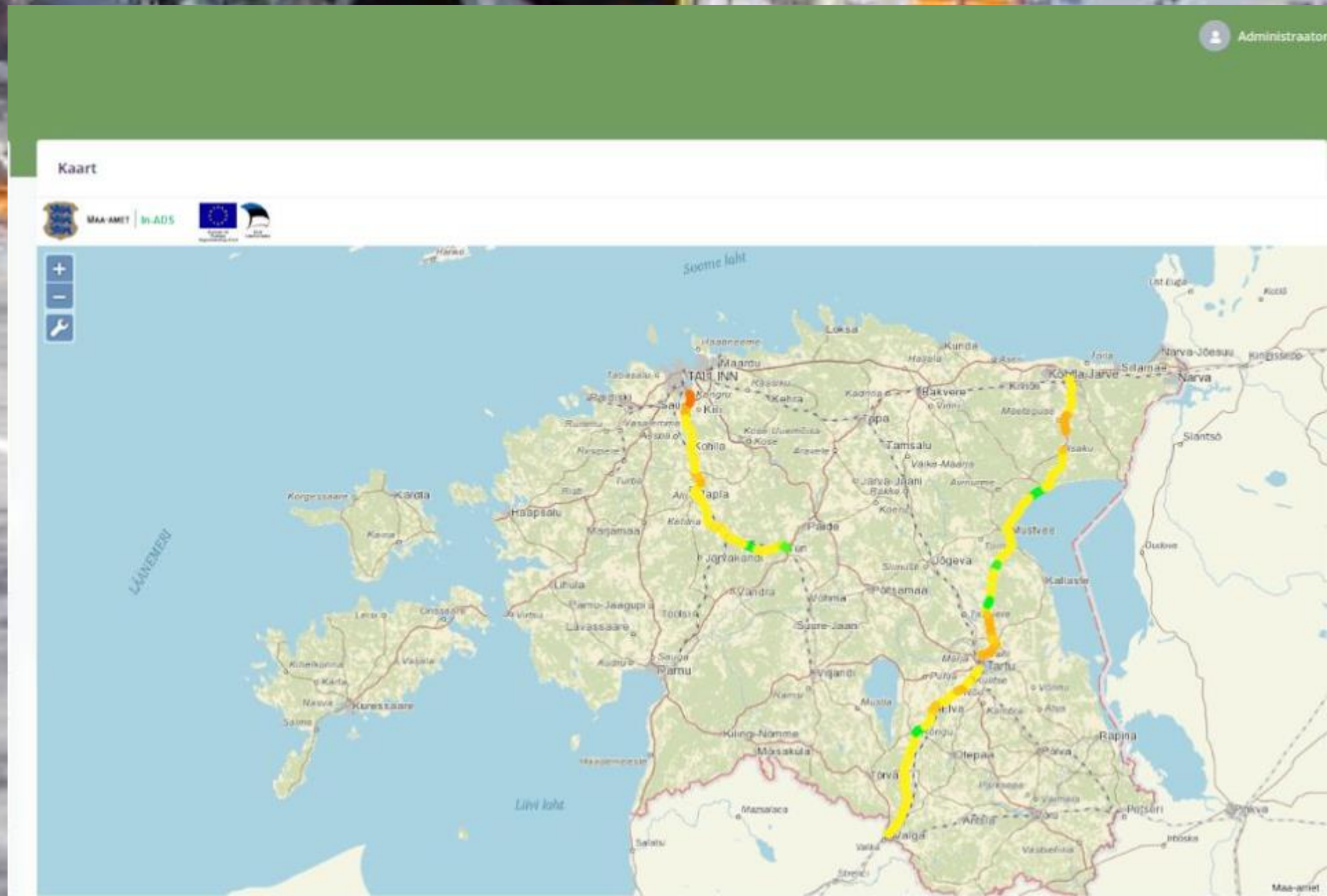
The ice map is updated on weekdays about 14.00

Clear-cutting

- 50,000 forest notifications per year that would require automatic closure upon realization
- More accurate reporting and a better overview of the state of forests
- Sentinel-2 + Sentinel-1
(together gave the best result)



Traffic accident prediction



Procurement automation

Koosta hankedokument

Hanke pealkiri

Generatiivse tehisintellekti olemust ja võimalusi selgitavate teoreetiliste

Hanke objekt

Teenus

Hangitava objekti kategooria

Koolituse materjalide väljatöötamine...

Hanke objekti lühikirjeldus ja eesmärk ⓘ

Töötervishoiuteenuse osutamine teenistujatele; Aktsiisipoliitika

Eeldatav maksumus km-ta ⓘ

20000

€

Hankelepingu rahastamisallikas

RRF

Teenuse CPV kood

Sisesta kood

Riigihangete strateegiliste põhimõtete kasutamine ⓘ

☒ Keskkonnahoidlik hankimine

☒ Sotsiaalselt vastutustundlik hankimine

☐ Innovatsiooni toetav hankimine

☒ Julgeolekuriske vähendav

Pakkumuse esitamise tähtaeg

10. mai 2025

Pakkumuse iõusoleku periood

Eelvaade

Väikehange „Generatiivse tehisintellekti olemust ja võimalusi selgitavate teoreetiliste koolitusmaterjalide väljatöötamine“

Käesoleva dokumendiga kutsub Justiits- ja Digiministeerium Teid esitama pakkumust väikehankel.

1. ÜLDINFO

Hankija nimi

Justiits- ja Digiministeerium

Hankija aadress

Suur-Ameerika 1, 10122 Tallinn, Eesti Vabariik

Hanke eest vastutav isik

Eesnimi Perenimi, telefon +372 12341234
eesnimi.perenimi@justdigi.ee

Hanke objekt

Teenus

Hangitava objekti kategooria

Koolituse materjalide väljatöötamine

Hanke objekti lühikirjeldus ja eesmärk

Töötervishoiuteenuse osutamine teenistujatele; Aktsiisipoliitika riskide, võimaluste ja mõju majanduskeskkonnale piirikaubanduse tingimuste analüüs

Eeldatav maksumus km-ta

20000 eurot

Hankelepingu

rahastamisallikas

Lepingu ese on finantseeritav Euroopa Liidu taaste- ja vastupidavusrahastu (RRF) fondist. Töövõtjal tuleb töö teostamisel teavitada avalikkust ja tegevustes osalejaid toetuse päritolust, viidates kõnes või tekstis, et projekti on rahastanud Euroopa Liit taasterahastu NextGenerationEU vahenditest ning kasutades objektide ja avalikkusele suunatud esemete ja dokumentide märgistamisel logo Euroopa Liidu embleemi koos tekstiga „Rahastanud Euroopa Liit – NextGenerationEU“. Logo kasutamise nõuded on leitavad Riigi Tugiteenuste Keskuse [veebileheküljelt](#) ning täpsemad teavitusjuhised on leitavad [Taaste- ja vastupidavuskava elluviimise korralduse ja toetuse andmise](#)

backbones

- + X-road
- + electronic ID
- + data portal
- + data catalogues
- + data stewards

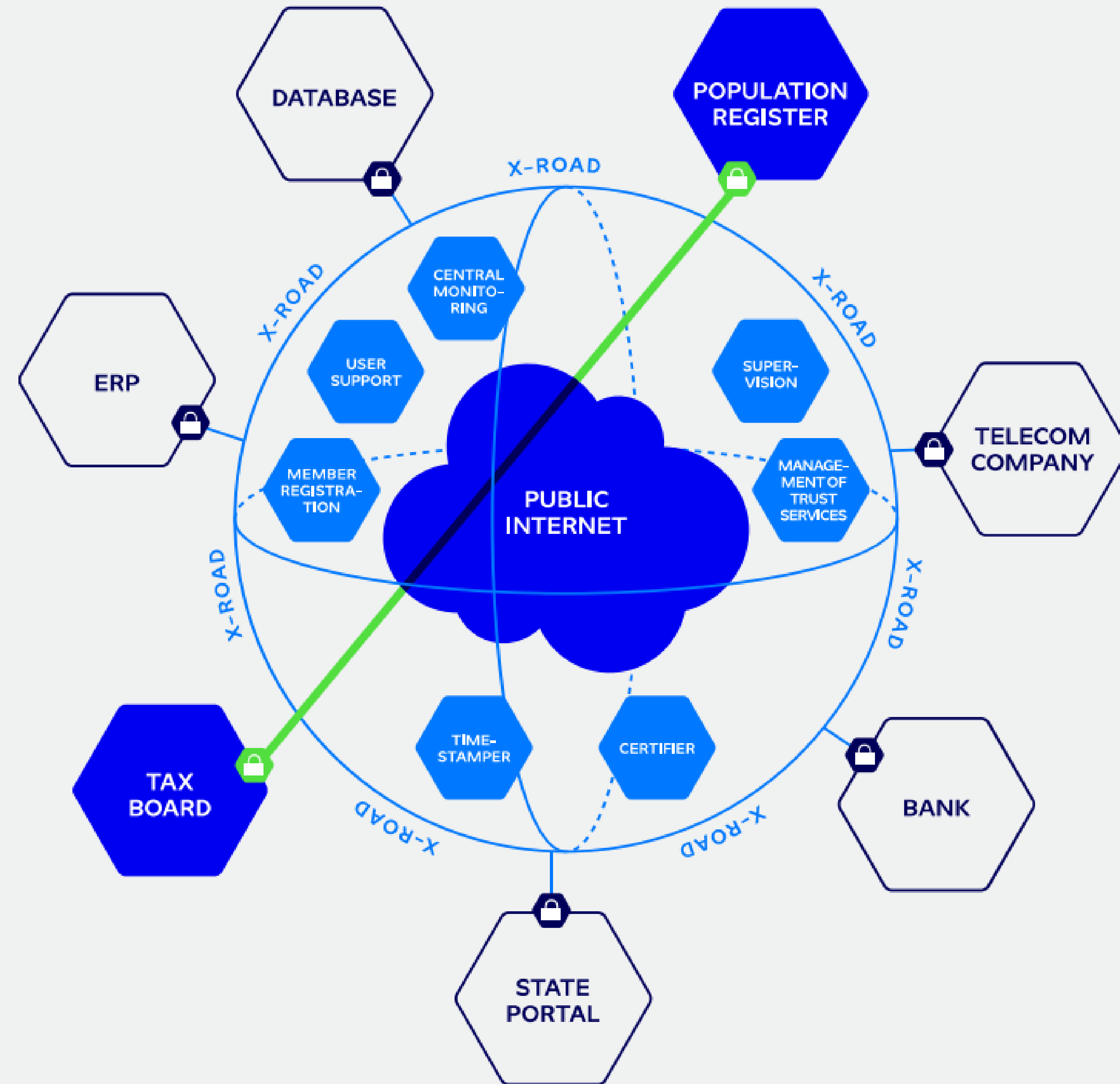
x-road

the backbone of the e-State since 2001

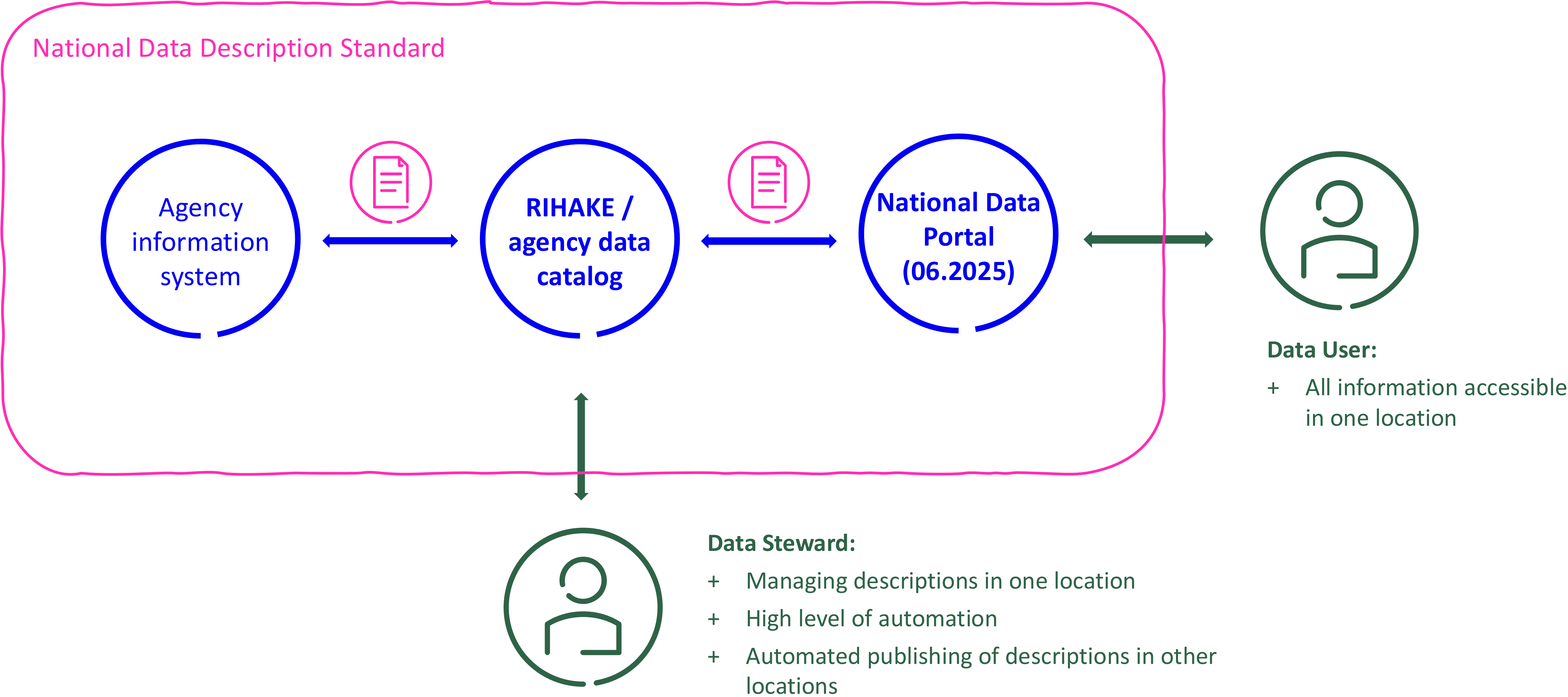
X-Road® – an open-source platform for secure data exchange between organisations, used by the world's leading digital nations.

X-tee – the Estonian X-Road® ecosystem since 2001

- + saving 3 million working hours annually
- + over 3,000 different services
- + over 2,5 billion transactions per year
- + over 500 million citizens as end-users



Data management tools



Data mapping and description

Data description (aka metadata) as an enabler of data management

- + "order in the house"
- + We know what data we have, where it is stored, how much personal data there is, how long it must be stored, how the data is related to each other, we can measure its quality, ...

Data description as an enabler of data use

- + users can find, understand and effectively reuse our data



FINDABLE

Data has rich metadata and unique identifier



ACCESSIBLE

Data can be easily downloaded or used by using standard protocols



INTEROPERABLE

Metadata use an accessible and standard language



REUSABLE

Data is well-described and provides clear usage of licences

DCAT – Data Catalog Vocabulary

Abbreviations:

DCAT: international (W3C) specification for data portals

DCAT-AP: European Union extension (application profile) to DCAT

DCAT-AP-HVD; DCAT-AP-DGA: DCAT-AP extension profiles based on specific legislation

Estonian Data Description Standard (also DCAT-AP-EE): Description profile implemented in the Estonian Data Information Gateway (and RIHAKEs), which also corresponds to the DCAT-AP, -HVD and -DGA extensions

NB! The use of the standard is required when exchanging data descriptions, not within the institution!

Principles of data description

Holistic overview of data

- Data must be findable and understandable both inside and outside the organization

Interoperability

- There must be a consensus across institutions on what and how data is described (and shared with others)

Semantics

- You can find and use data that is described in a consistent and understandable vocabulary.

Know the data

- A good data description can be prepared by an expert who knows the field.

Data quality principles (some)

Sufficiency principle

- Data should be *fit for purpose*

Know your customer

- Data quality principles can be established once you know data user

“adequacy” changes over time

- As data users change, as time passes, the needs requirements on data quality changes

Data quality principles (some)

Consistency of data quality across different datasets

- A business rule set once for a dictionary term is applied consistently to datasets where data corresponding to the term is found.

Transparency and integrity of data quality management

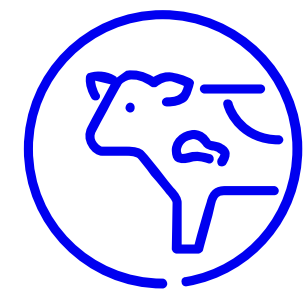
- Business rules are collected and managed centrally (for example, in a data catalog or a dedicated data quality tool)

Situational awareness and ability to respond to problems

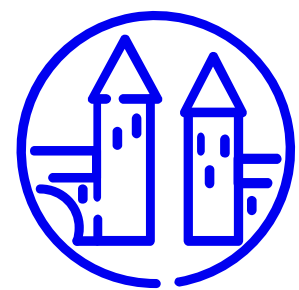
- Data quality rules are valuable when they are set with measurement and visualization, as well as principles for reporting and problem solving.

data spaces

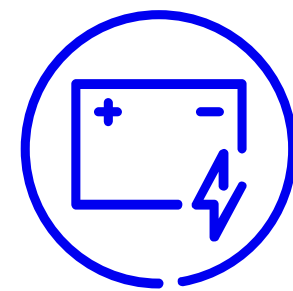
Common European Data Spaces



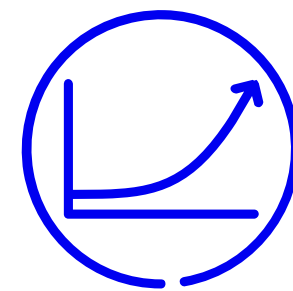
Agriculture



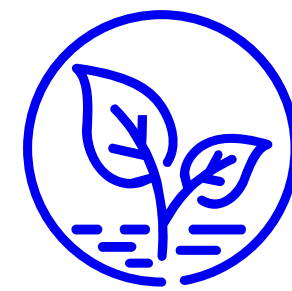
Cultural Heritage



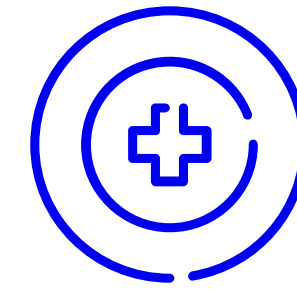
Energy



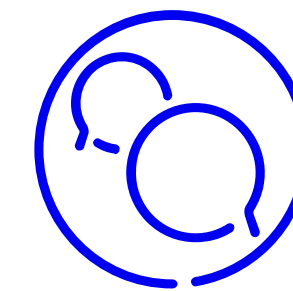
Finance



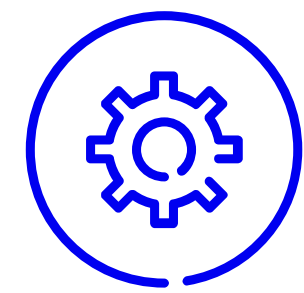
Green Deal



Health



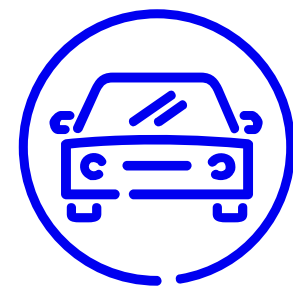
Language



Manufacturing



Media



Mobility



Public
Administration



Research
and Innovation



Skills



Tourism

- + Data Spaces Support Centre (DSSC) Strategic stakeholder Forum
- + long-term plan for Estonian data spaces (2025-2035)
- + data architecture of the data spaces
- + X-road compliance with data spaces (2026-2027)

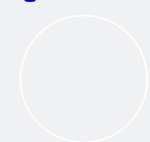
AI infrastructure

Next generation AI development center, through which the largest AI models are trained and developed.

Tens of thousands of specialized AI processors, cutting-edge computing power, energy efficiency, and sovereignty.

Regulatory and technical sandbox. AI scaler. Full-scale support.

Objective: to secure a strong position in global competition, independence and **support industrial and scientific public sector AI leap.**



Estonia as AI innovation testbed.



HUMAN-CENTRIC AND TRANSPARENT AI



data tracker

Data tracker allows citizens to see when, how and why their personal data is processed in the state’s databases

It enables a central overview of the data processing that has occurred, without the need to visit various websites and portals or request this information via e-mail

Soon mandatory for all public sector organisations

Display filtered queries			
Date ↓	Query performed by	Information System	Query name
09.01.2025 16:50	EE39309072771	Digital Prescription Center	Retseptide info vaatamine
09.01.2025 16:50	EE39309072771	Digital Prescription Center	Retseptide loetelu küsimine patsiendi poolt
09.01.2025 16:50	EE39309072771	Digital Prescription Center	Retseptide info vaatamine
09.01.2025 16:49	EE39309072771	Digital Prescription Center	Retseptide info vaatamine
22.10.2024 15:51	EE39309072771	Digital Prescription Center	Retseptide loetelu küsimine patsiendi poolt
30.09.2024 08:42	Tervise ja Heaolu Infosüsteemide Keskus	Digital Prescription Center	Retseptide info vaatamine
26.09.2024 15:46	Tervise ja Heaolu Infosüsteemide Keskus	Digital Prescription Center	Retseptide info vaatamine

Choose information system

Search information system...

☐ Agricultural animal register

☐ Agricultural support and agricultural parcels register

☐ Digital Prescription Center

☐ Information System POLIS

☐ Labour Inspectorate's Work Life Information System

☐ Land Register

☐ Medical specialist eBooking system

☐ Police tactical command database

☐ Population Register

☐ Register of Occupational Qualifications

consent service

With the consent service it is possible for people to allow companies access their personal data in national databases

Voluntary convenience service, which is available through our state portal eesti.ee

Currently more than 1 500 000 data consents generated, main use cases in banking and healthcare

Recipient of the data	Sender of the data	Data	Nr	Valid from ↓	Valid until	Status
AS SEB Pank	Maksukohustuslaste register	Maksuandmete tõend	169989	02.01.2023	02.04.2023	Invalid

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digital twin as an empowering virtual copy of a person



Enabling access to personal data



Using data for service provision



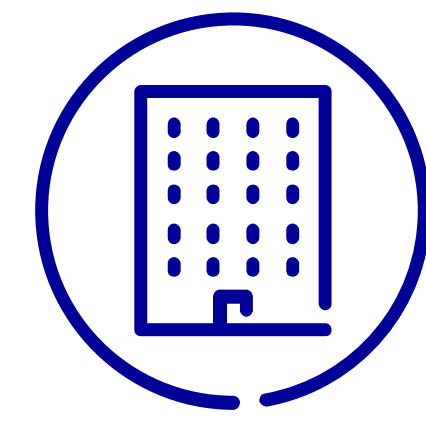
Ensuring transparency of data processing (data tracker+consent service)



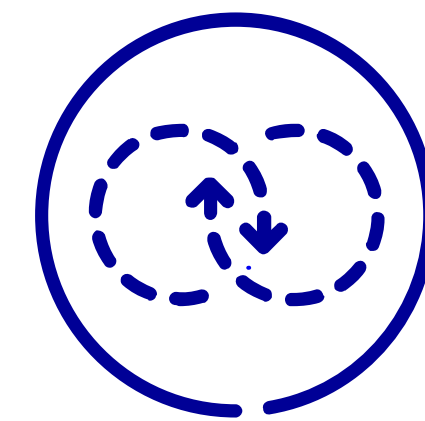
Implementing a registry culture – individuals control their own data



Managing decisions, preferences, needs, and rights related to data usage



Allowing citizens to correct and update existing data



Contextualizing data through a personal dashboard



Part of the digital ecosystem – interoperability with existing components

Let's make AI leap happen!



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