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Sustainable Multilingual AI for User Support in Public Transport:

How ATTG Reduced Load, Costs and Environmental Impact with Compressed Models

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Mobility, Green Transition & Public Transport

Public Transport is a key component in the future of mobility and decarbonization.

As any other organization, transport authorities need to evolve and handle challenges like:

- Growing passenger expectations
- Multi-operator, multi-modal ecosystems
- Increasing operational complexity
- Sustainability pressure
- Budget constraints



In this context digitalization is not optional anymore, it's essential, and AI emerges as an enabler for this transition.



MUGI



MUGI is the **integrated ticketing system** in Gipuzkoa.

It has a strong public service commitment and covers millions of transactions per year.

MUGI needs to coordinate multiple operators, tariffs and public regulations.



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Customer Support Challenges

- Thousands of user queries
- Different input channels (calls, emails, forms)
- Repetitive but complex information requests
- High variability in language and context
- Need for faster resolution, better classification
- Data privacy compliance





CUSTOMER SUPPORT: New solutions



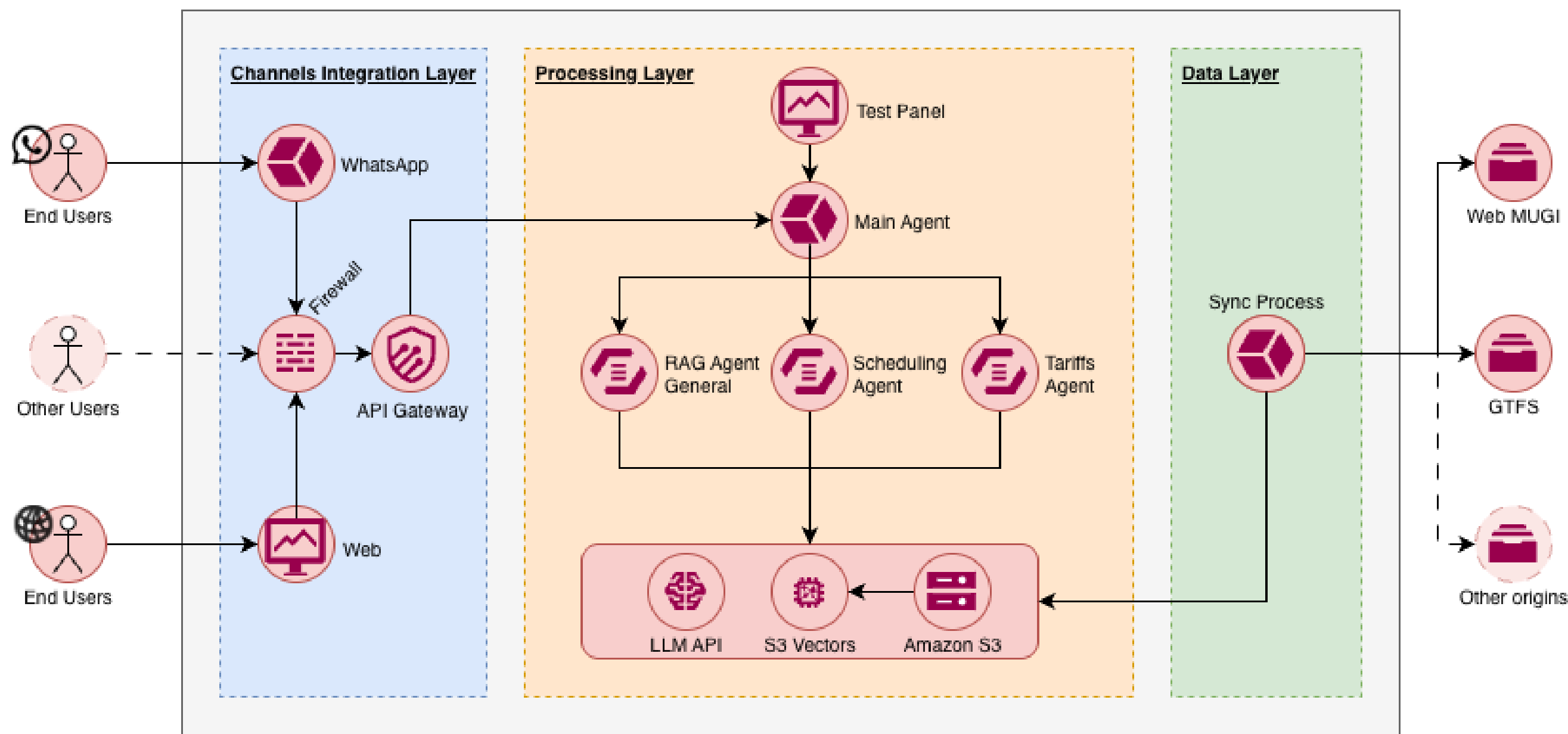
New Automated Channels

- WhatsApp, Web & App
- Easier access, faster support
- Improve customer experience





CUSTOMER SUPPORT: Architecture

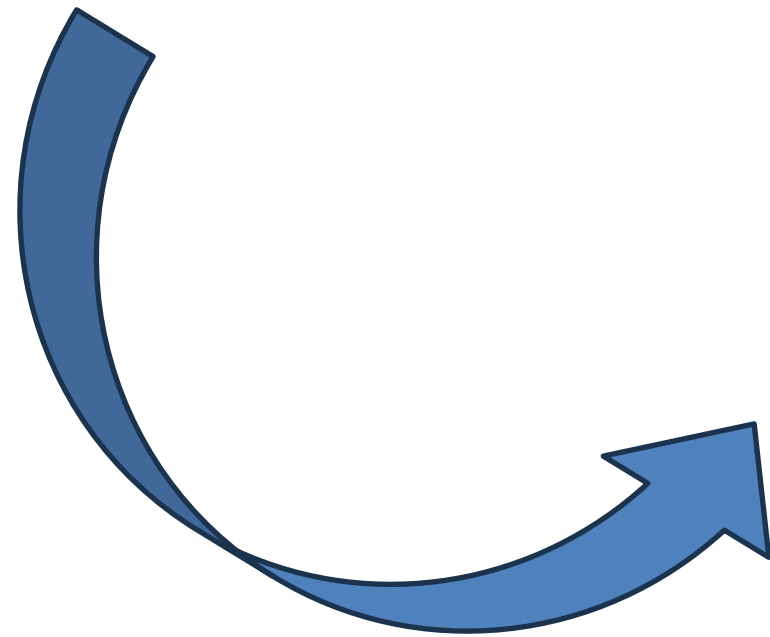




CUSTOMER SUPPORT: Technical Issues & Results

The development process brought some well-known problems:

- Data not updated or not easily available
- Difficulty understanding the language and expressions of the users
- Lack of interoperability and integrations between systems



Tú
Hola, ¿puede mi hijo viajar gratis?

Mugi

Sí, su hijo puede viajar gratis si tiene menos de 15 años. Para que se aplique el beneficio debe usar la tarjeta Mugi Gazte y seguir las instrucciones específicas de cada operador:

- En Lurraldebus y en los autobuses urbanos de Irun, Errenteria, Eibar, Zarautz, Arrasate, Hernani, Tolosa, Lasarte-Oria, Oiartzun, Oñati y en la motora de Pasaia, el menor debe mostrar su tarjeta Mugi Gazte al conductor. El conductor le entregará un billete gratuito en papel. Si el conductor tiene dudas, puede solicitar algún documento que compruebe que el niño es menor de 15 años.

- En DBus, Euskotren y Renfe Cercanías, el acceso gratuito se produce de forma automática. Basta con que el menor pase su tarjeta Mugi Gazte por los tornos o lectores de acceso y el viaje se validará a coste cero.

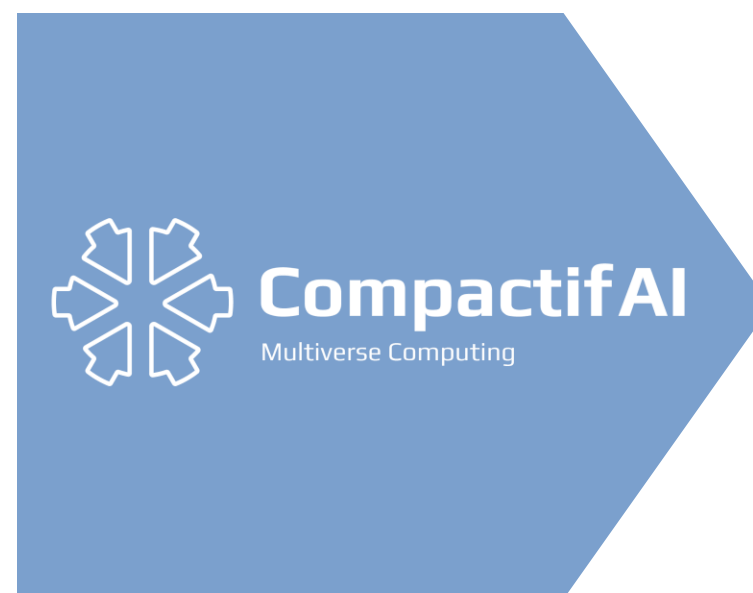
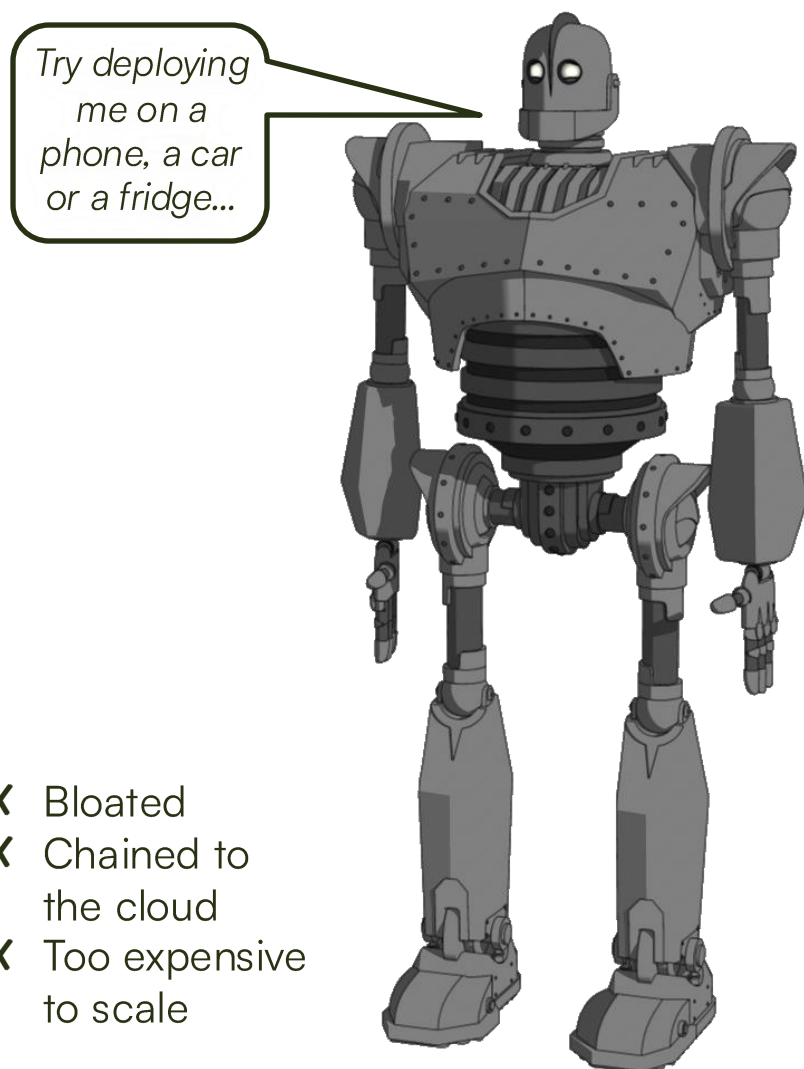
En todos los casos, el menor debe portar la tarjeta Mugi Gazte y presentarla al conductor o al lector correspondiente. Si el conductor necesita comprobar la edad, puede pedir un documento que lo acredite.

50% of typical user requests solved by the AI

Less than 5 seconds in average to get an answer

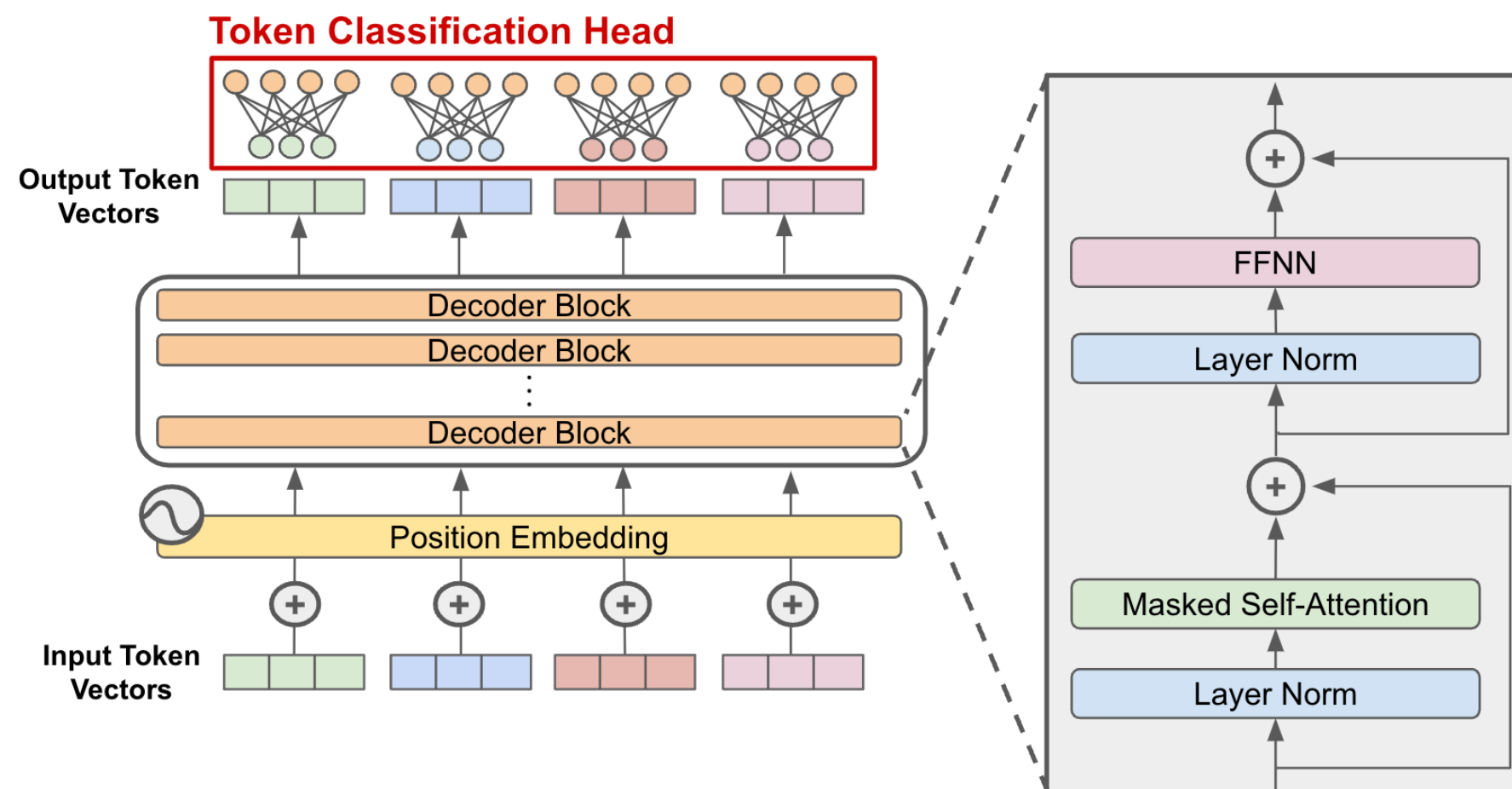


CompactifAI as a key enabler for **reduced energy, latency and cost of AI operations.**



Compressed AI Models

- ✓ 10x smaller
- ✓ Just as smart
- ✓ Deployable anywhere



Most Large Language Models follow a similar architecture:

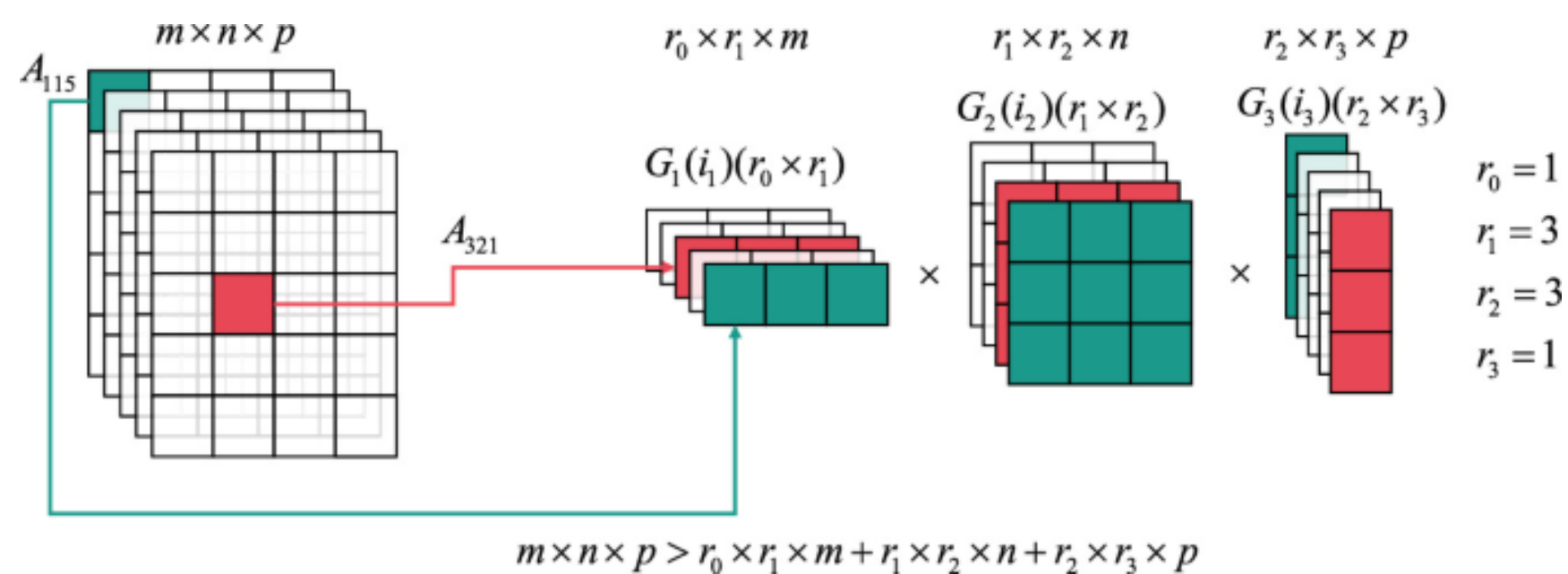
- Autoregressive Language Models
- Decoder Only Architecture
- Core Blocks are Matrix Products

Tensor Train Decomposition allows us to decompose a matrix as a combination of smaller tensors.

In this tiny example:

Original: $M \times N \times P = 100$ parameters

Decomposed: $12 + 27 + 12 = 51$ parameters



In LLMs it is common to see matrices of 8192×8192 with ~ 67 million parameters where compression reach up to 90% of the original size.



BEYOND AUTOMATION: Generating Strategic Data

Customer requests contain **rich information**, but the **data is underexploited**.

Compressed AI allows us to **process and explore massive amounts of unstructured data** coming from different sources like calls or emails.

While ensuring **data privacy and sovereignty**. And keeping operational costs under control.

Unstructured Data



Structured Intelligence





“With great data comes great responsibility”

Add governance, security and interoperability, ensuring compliance with GDPR.

- Data doesn't flow outside the organization.
- No cloud provider dependency.

Allows more control and interpretability, ensuring compliance with AI Act.



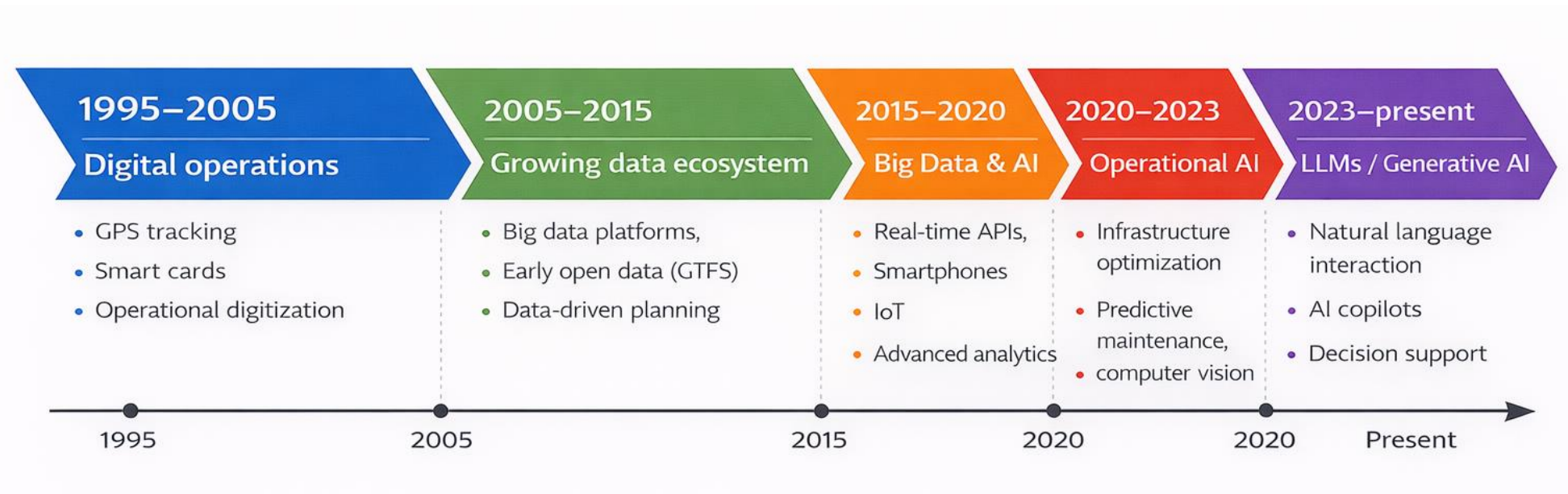
Smaller models = more control





BIG DATA & AI IN TRANSPORT

This is a **natural step** in the evolution of Public Transport:



The combination of unstructured data together with other data sources like ticketing, and forms of AI, like forecasting and optimization, should unleash the future of Smart Transport.





Applications of this intelligence:

- Detect emerging service disruptions
- Identify ticketing friction points
- Monitor public sentiment
- Improve tariff design
- Adapt transport routes and scheduling



ECONOMIC AND CLIMATE IMPACT

Economic:

- Reduced operational costs
- Increased productivity
- Better resource allocation



Climate:

- AI enabling modal shift
- Better service quality → increased public transport adoption
- Lower AI energy consumption through CompactifAI





CONCLUSIONS

AI is not just about automation — it is about enabling smarter, greener, and sovereign mobility systems.

- AI can enhance public transport user services
- CompactifAI makes LLMs sustainable and sovereign
- User support data becomes strategic intelligence
- Sustainable AI supports sustainable mobility use cases

