



# Amorfs - Reusable Data

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# The biggest unsolved problem in IT...



- We're going to keep going after every company's **connectivity** challenges -- where it's SaaS, IoT, and so on.
- For every dollar they spend on software, they will spend another five or seven dollars on making it all work
- \$600bn or \$700bn spent each year - we see this as only a fraction of the market

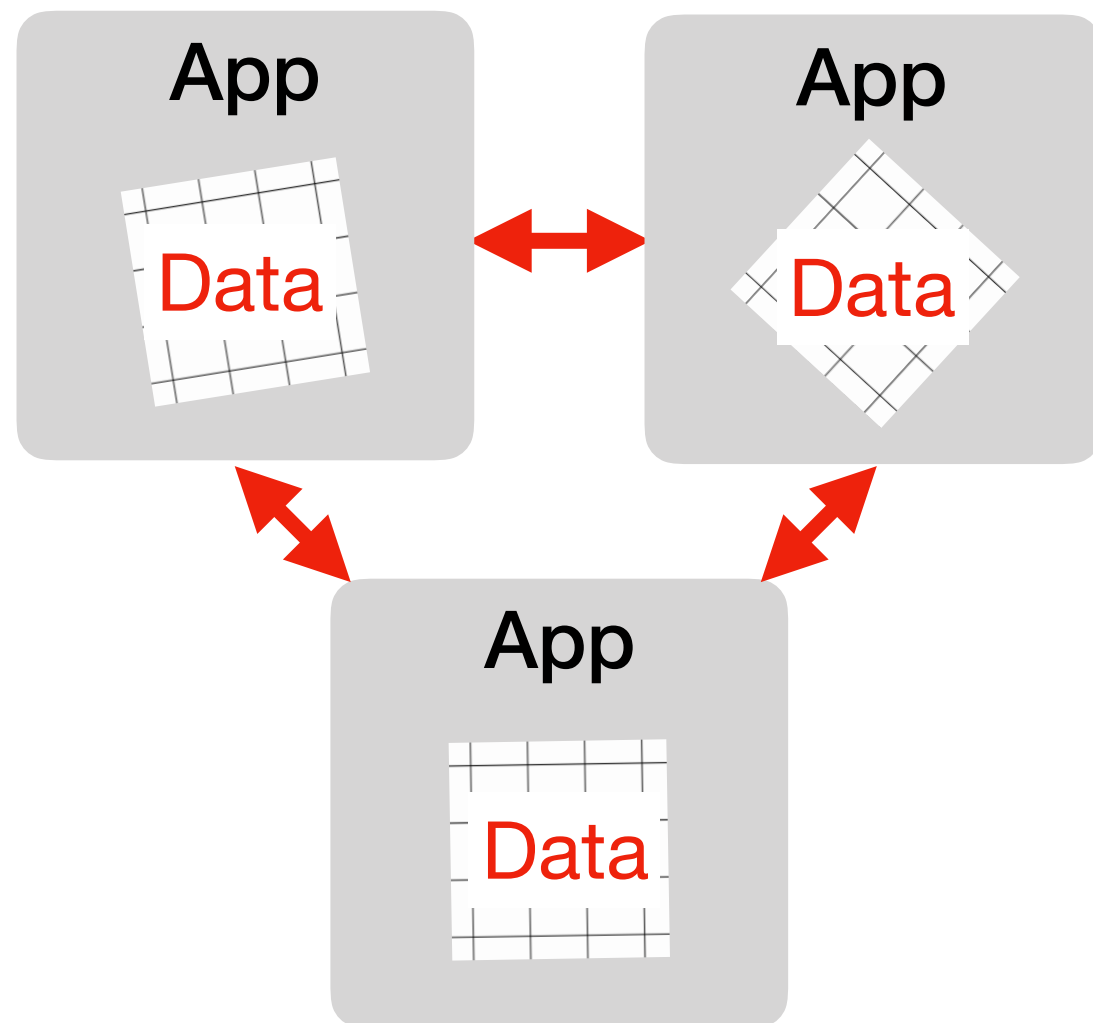
- Mulesoft CEO Gregg Schott

# Solve the underlying connectivity challenge

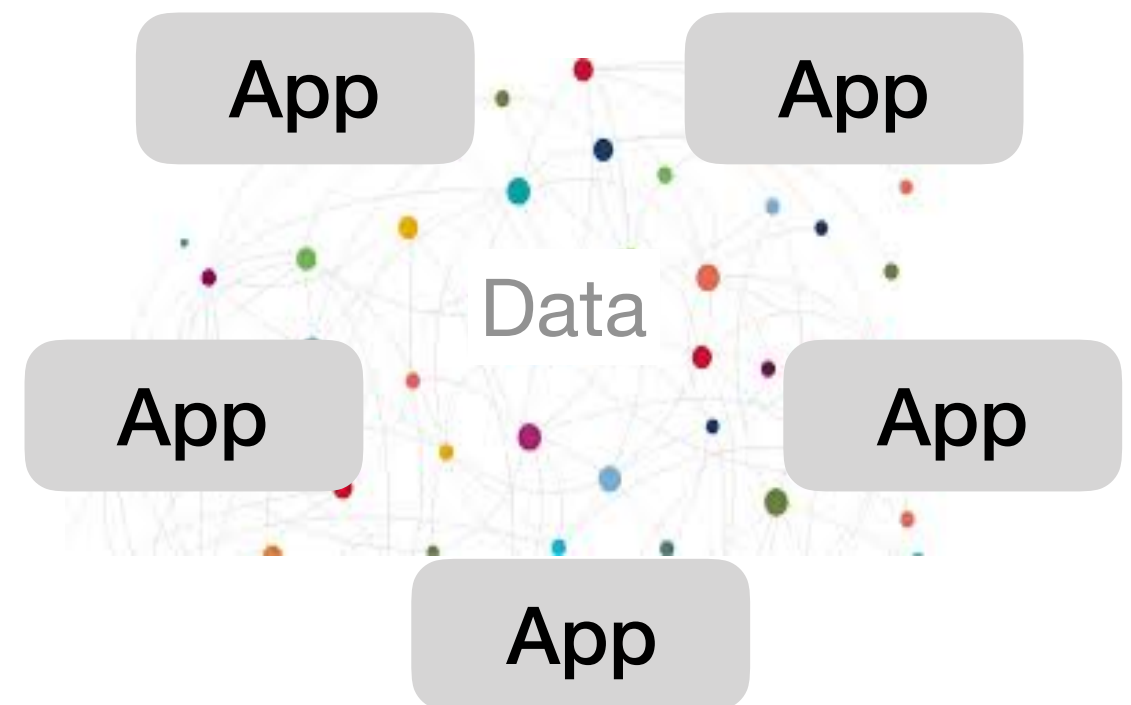
- A universal information format
- Based on a novel data model
- That makes all application data reusable by any other application

# A new dimension of meaning that turns data into knowledge so it's easy to share

From **Complex** Integration...



...to Shared Information



# A business model that leverages public domain and proprietary elements

Partnership and Third Party

Professional Services

Connectors

Industry Solutions

Public Protocols

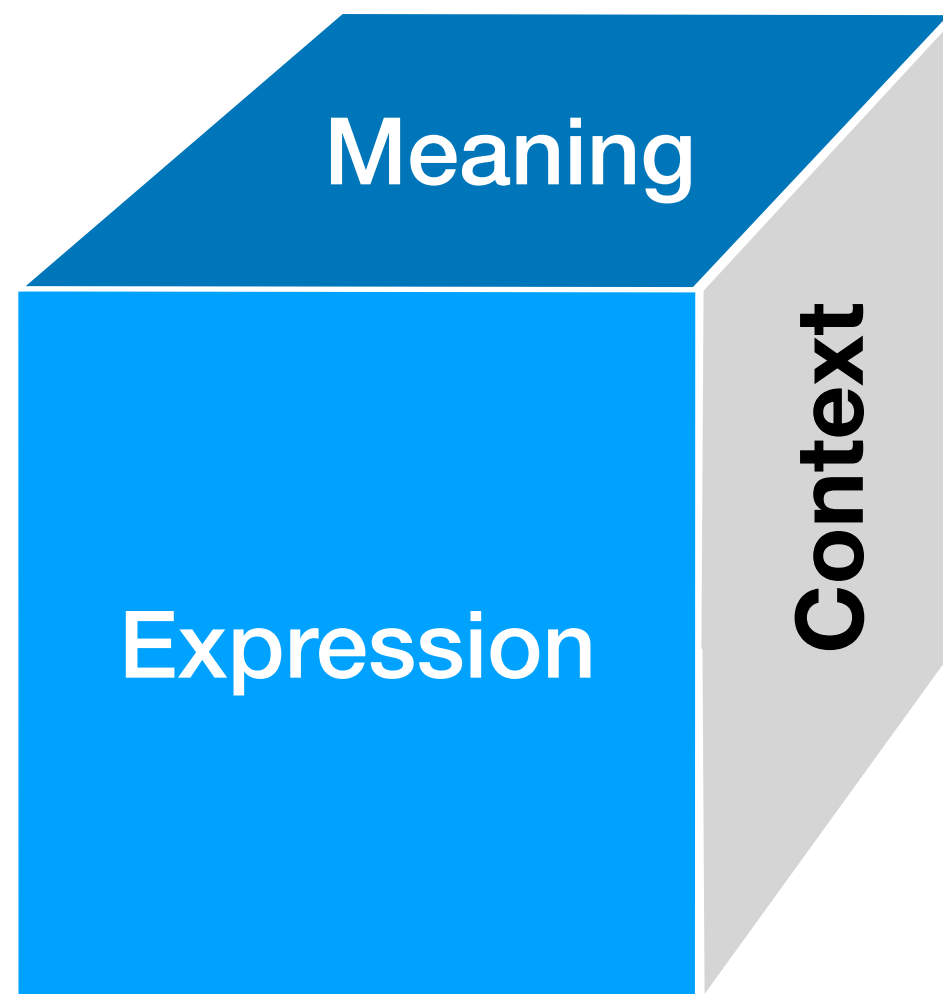
Applications

Marketplace

Public and Co-Innovation

# Interoperable with established data models so applications can share information easily

## Amorfs Information Model



Metadata

## Legacy models

- Hierarchical
- Relational
- Network
- Object-oriented
- Entity-relationship
- Document
- Entity-attribute-value
- Star schema
- Object-relational
- Semantic model
- Named graph
- Triplestore

# Pete Chapman invented our data model



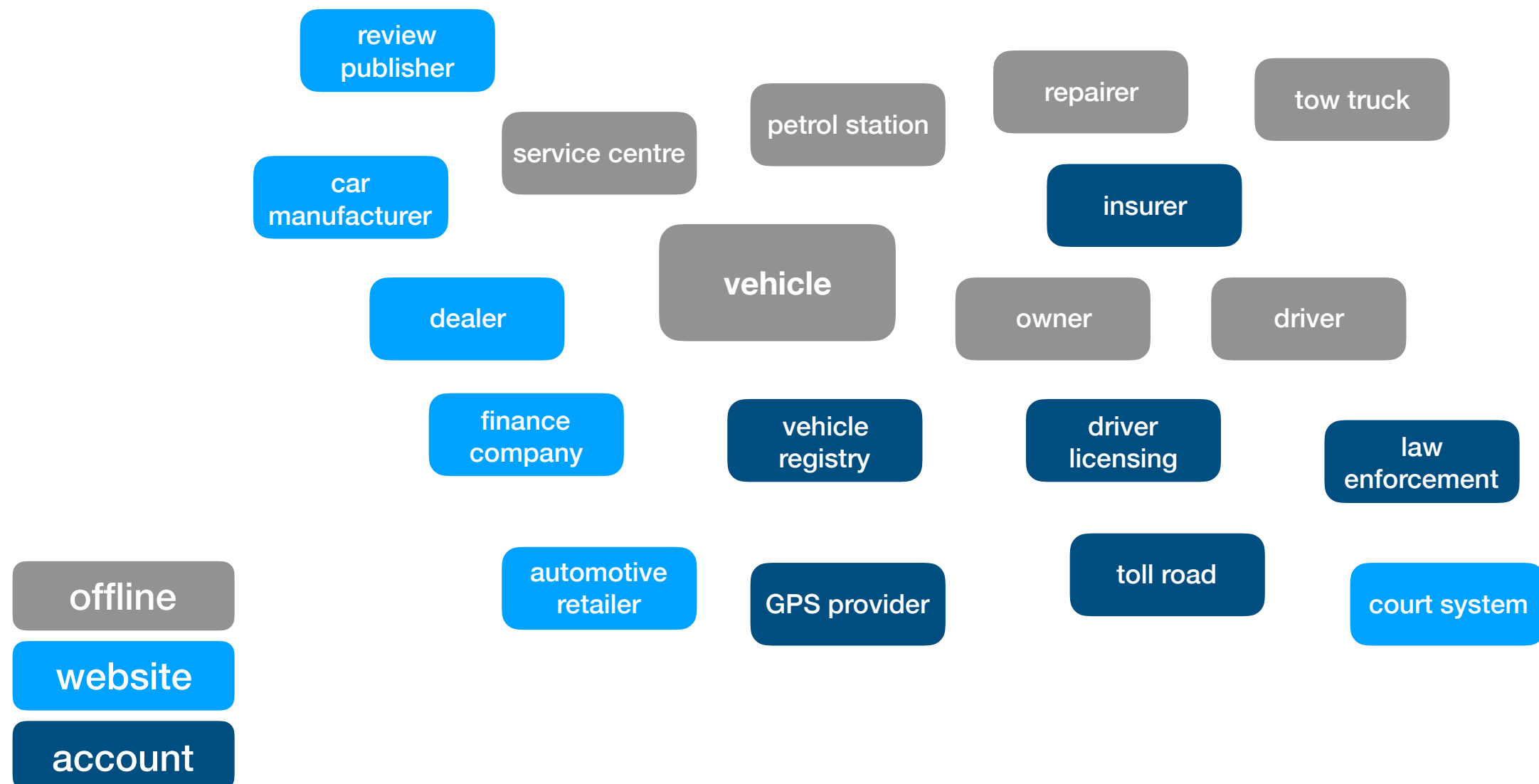
- Architect for Australian Government \$1.7B welfare transformation programme
- MSc in Cognitive Science with global awards for innovation
- Asia-Pacific Technology Director at EY



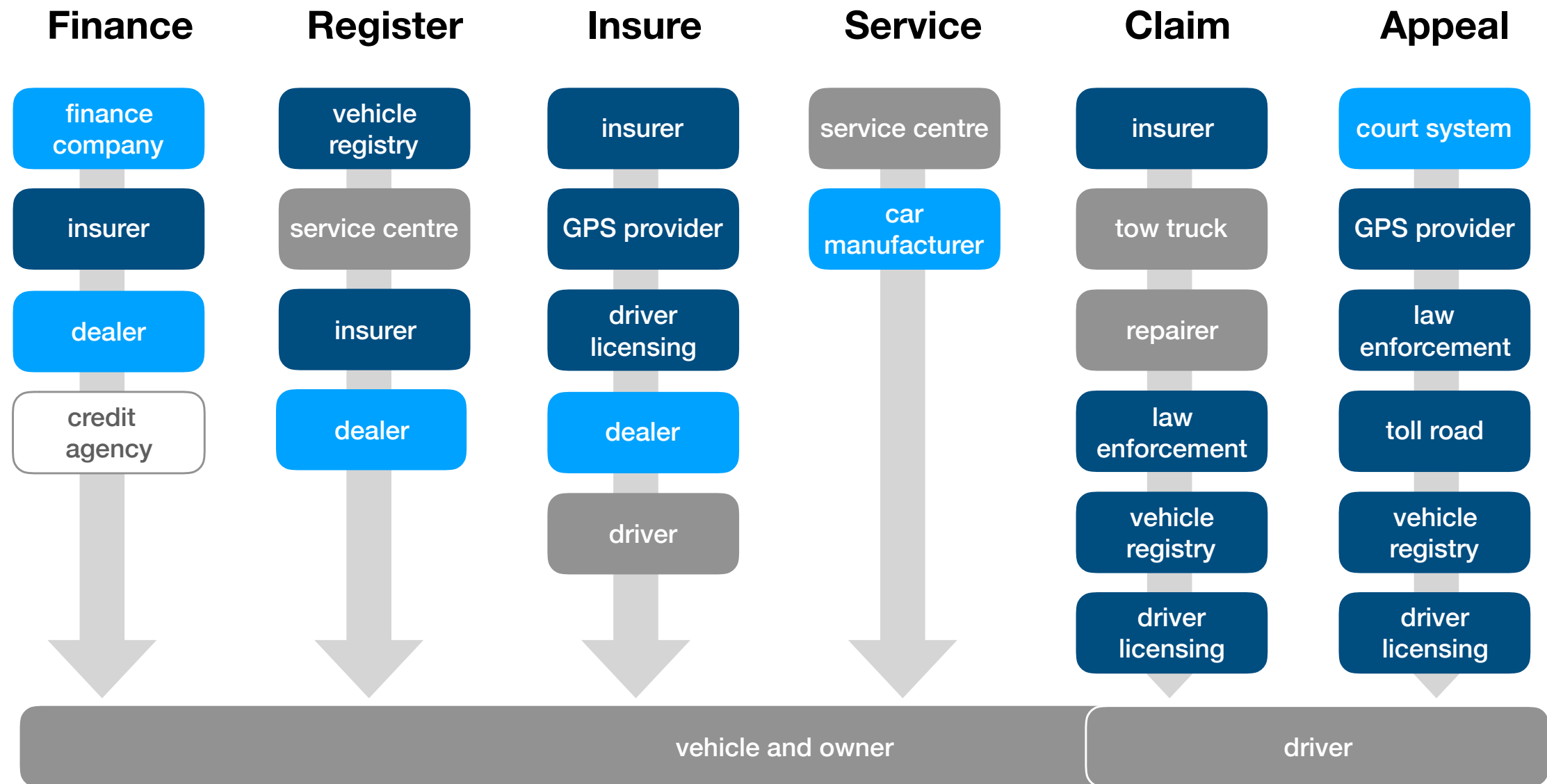
## Example Scenario

# Highest impact for multi-party processes with high integration costs, often public sector

## e.g. Car Registration and Ownership



# Routine processes touch many organisations



*Data is continually re-entered manually,  
which is time consuming, error prone and needs validation*

# Stakeholders find it hard to share existing information



**Insurance  
Claim**



**Service  
Report**



**Ownership  
Record**



**Penalty  
Notice**



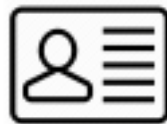
**Registration**



**Insurance  
Policy**



**Toll Charge**



**License**



**Mileage  
Claim**



**Fuel  
Receipt**



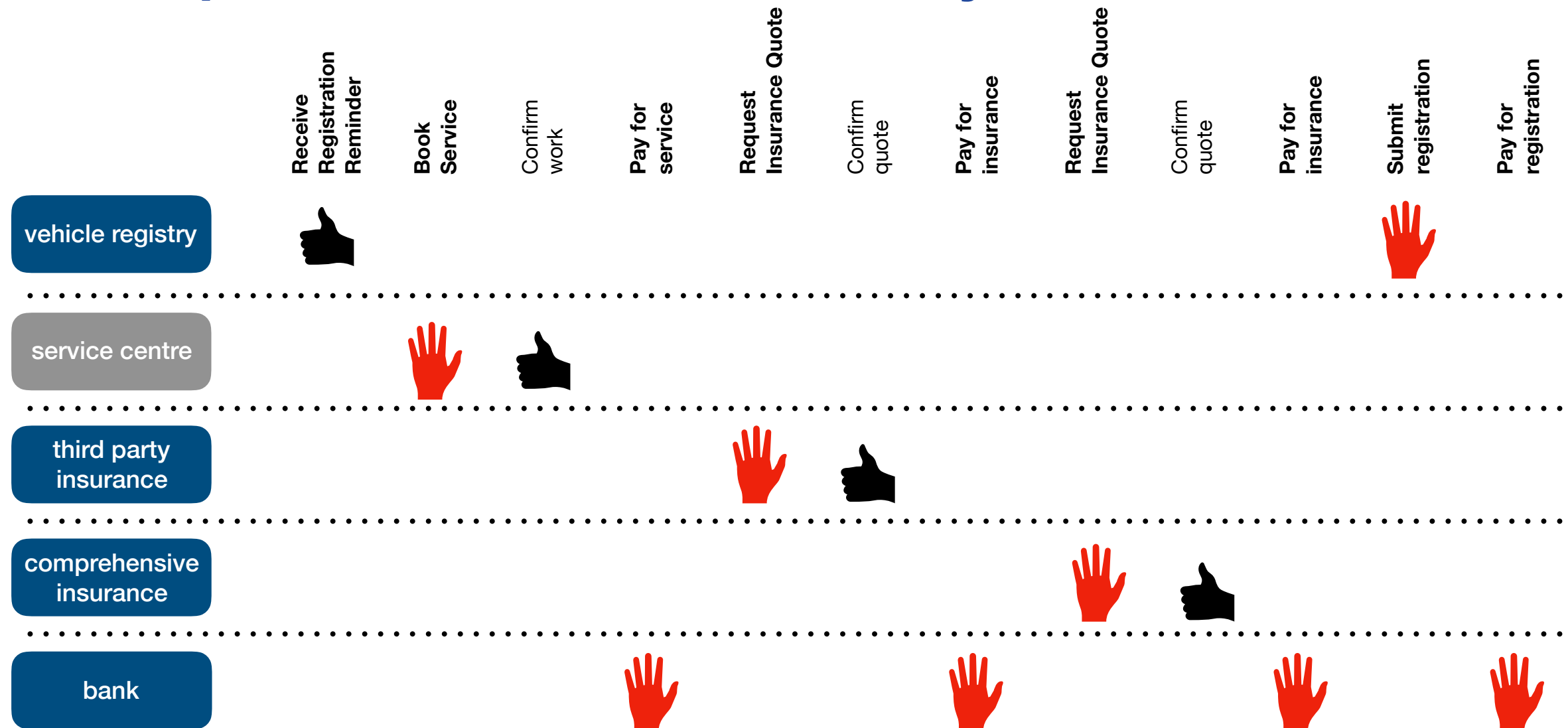
**Parking  
Charge**



**Payment**

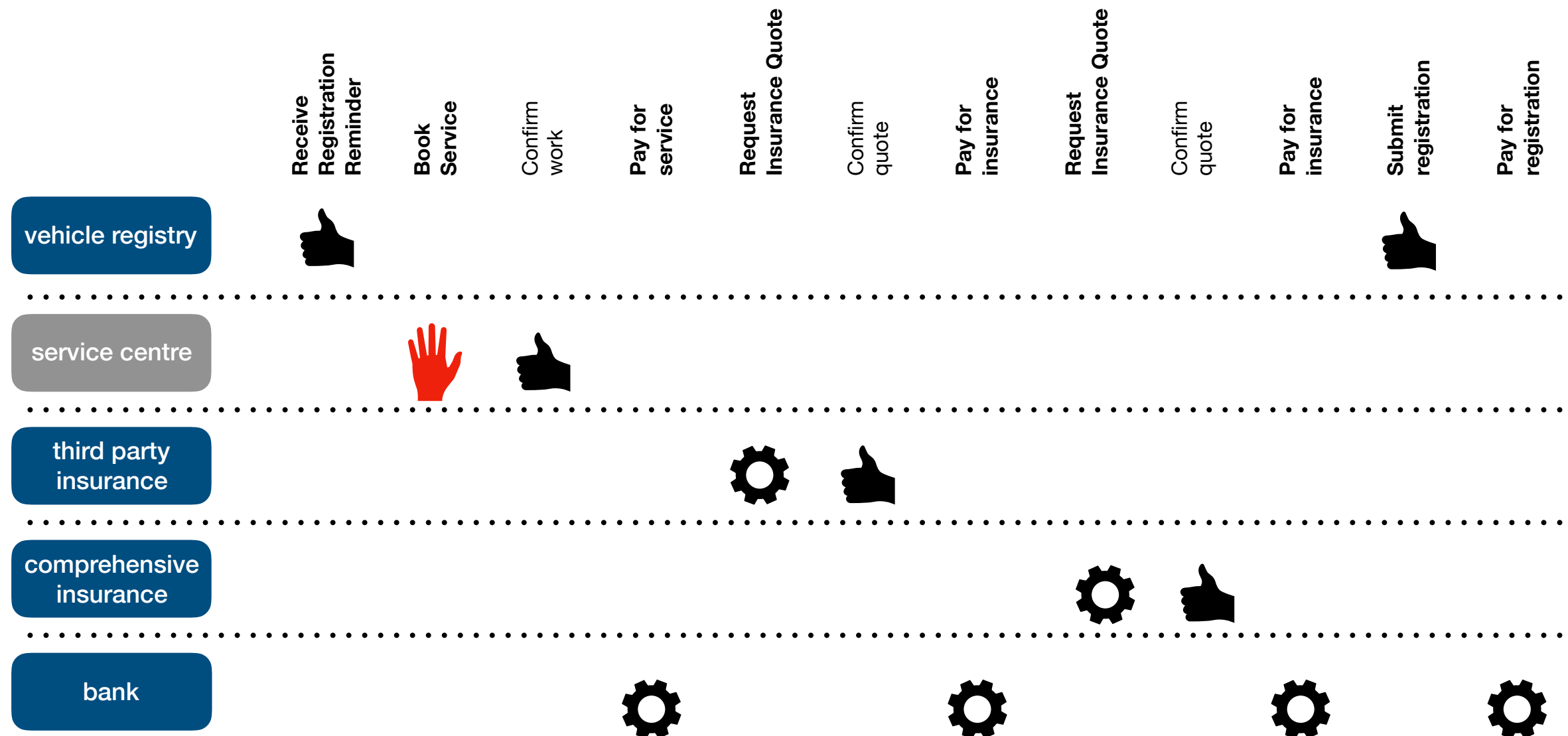
*Every application uses a different data format  
making the data incompatible*

# Registering a vehicle requires time-consuming error-prone manual data entry



*Actions require many logons  
and rekeying vehicle and insurance details for every quote*

# With sharable data unnecessary manual steps are removed



*Completed using a single logon and no data entry considering quotes from every eligible insurer*

# Technology Description

# Existing data models are incompatible across applications

- Applications are incompatible by design and require manual integration to share data.
- Manual integration consumes up to 30% of IT project budgets
- Without integration data that already exists must be re-entered
- Block chain needs data that can adapt with business requirements
- Smart cities need to share data between unfamiliar applications and devices
- Data lakes ingest incompatible data and rely on consumers to make sense of it

*To make integration seamless  
data must be compatible across every application*



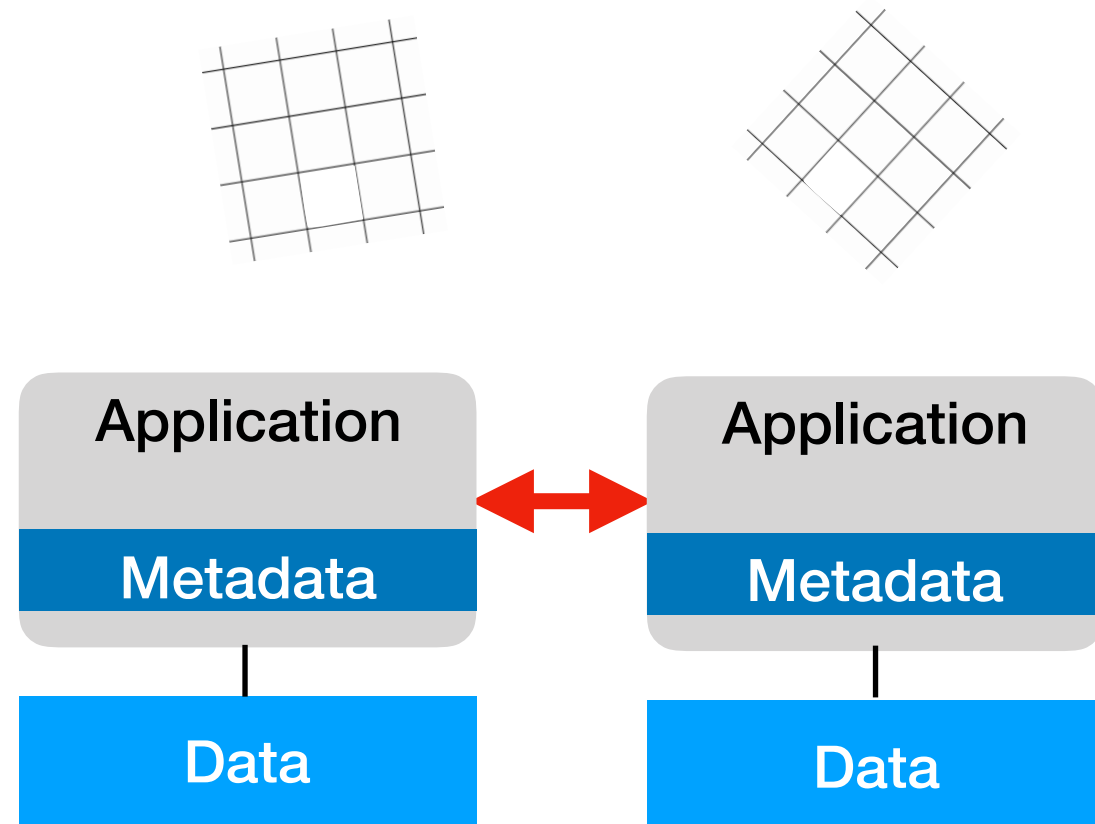
# Amorfs is a new conceptual data model

Kind	Description	Examples
Conceptual	Information model	Flat, Hierarchical, Network, Relational, Star schema, <b>Concept-oriented (includes Amorfs)</b>
Logical	Data format, syntax and rules	XML, json, neo4j, Cassandra, MySQL, Parquet, CSV, Turtle, <b>A-Text</b>
Physical	Storage hardware	In Memory, Disk, USB Drive

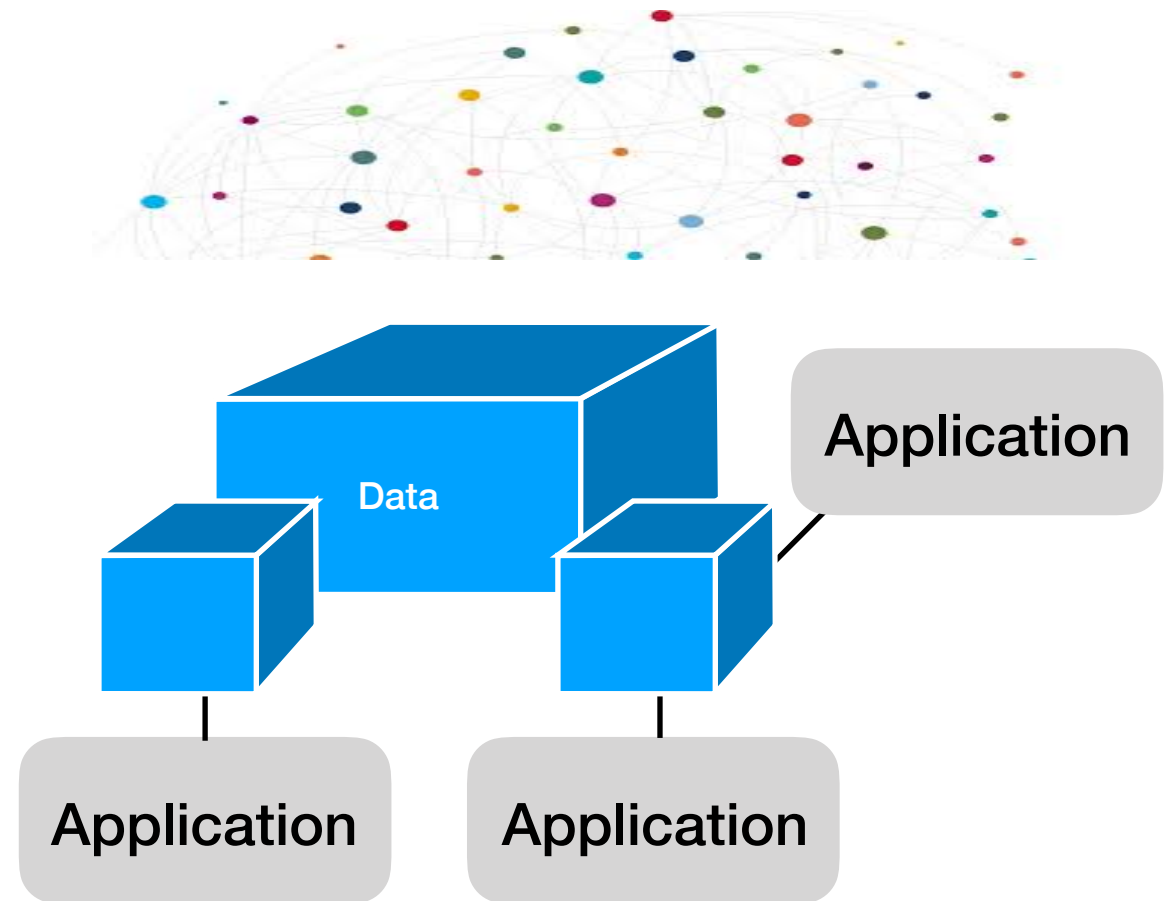
*The Amorfs model is powerful enough  
to be compatible with every existing format*

# Amorfs includes an extra dimension that turns data into knowledge

## From Complex Integration...



## ...to Shared Information



*Amorfs literally represents human thoughts and ideas as physical concepts in digital storage*

# Amorfs has many advantages over existing data models

Model	Expressive	Flexible	Contextual	Mutable	Portable
1. Tables	Low	Low	Low	Low	Low
2. RDF	Medium	High	Low	Medium	Medium
3. Amorfs	High	High	High	High	High

## Amorfs advantages:

- Highly intuitive, reflects human knowledge representation
- Store anything, convert from any format
- Highly suited to machine learning and AI applications
- Multi-lingual including machine readable formats
- Self-normalising
- Leverages existing semantic web technology
- Innately portable

*Amorfs structures are more flexible, powerful and shareable, ideal for supporting a new generation of data processing*

# 1. Tables are predefined, rigid and limited in what they can represent

Quality	Score	Description
Expressive	Low	Rows and columns
Flexible	Low	Predefined headers
Contextual	Low	Filename
Mutable	Low	Fixed structure
Portable	Low	Compatible applications

```
contact-person.csv
full name,mailbox,personal title
Eric Miller,e.miller123@example,Dr.
```

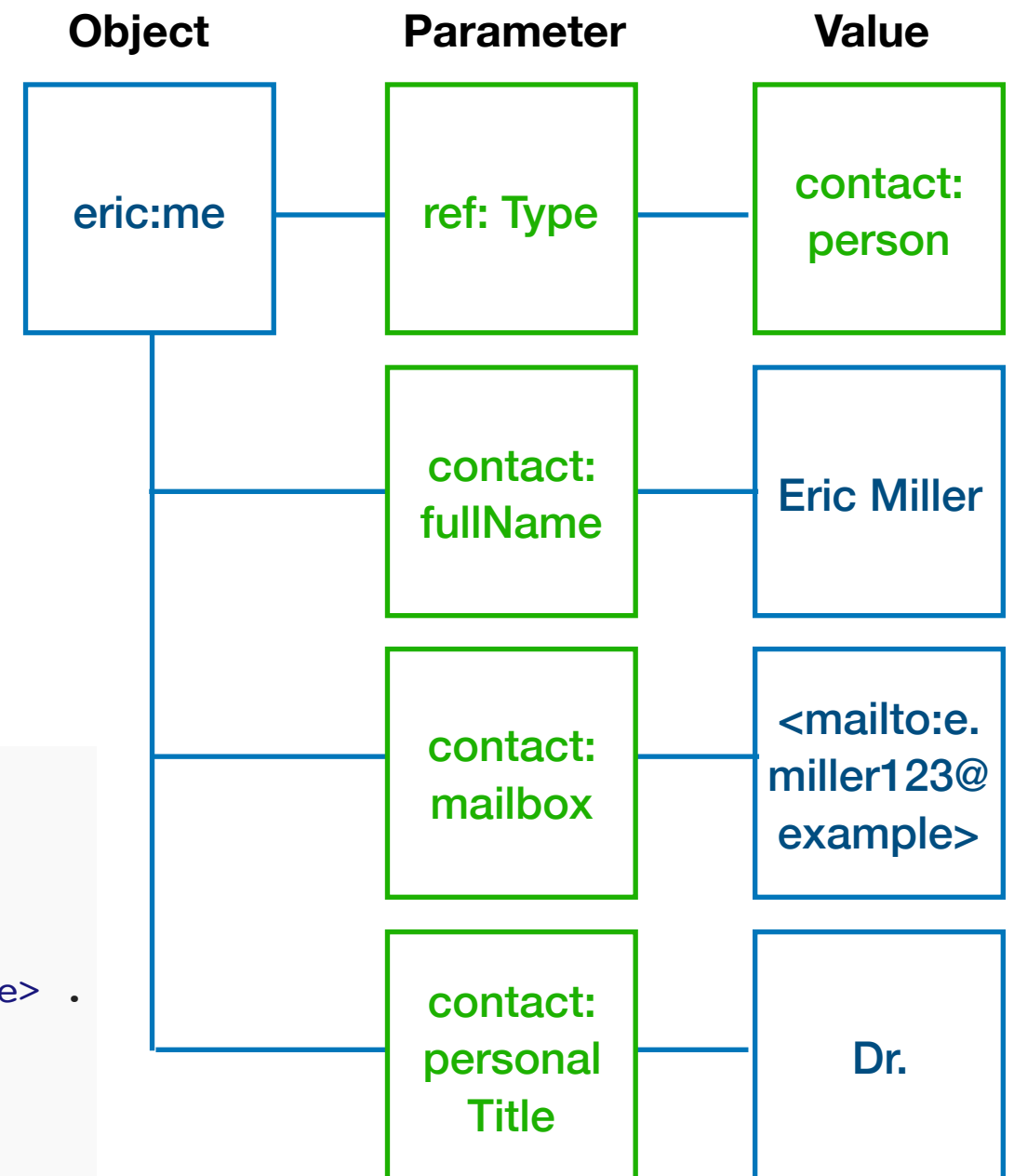
contact-person.csv

full name	mailbox	personal title
Eric Miller	<mailto: e.miller123@ example>	Dr.

## 2. RDF is more flexible and expressive but does not store information context

Quality	Score	Description
<b>Expressive</b>	Medium	Parameter Value pairs
<b>Flexible</b>	High	Unlimited parameters
<b>Contextual</b>	Low	Object based
<b>Mutable</b>	Medium	Triple set chains
<b>Portable</b>	Medium	Shared parameters / values

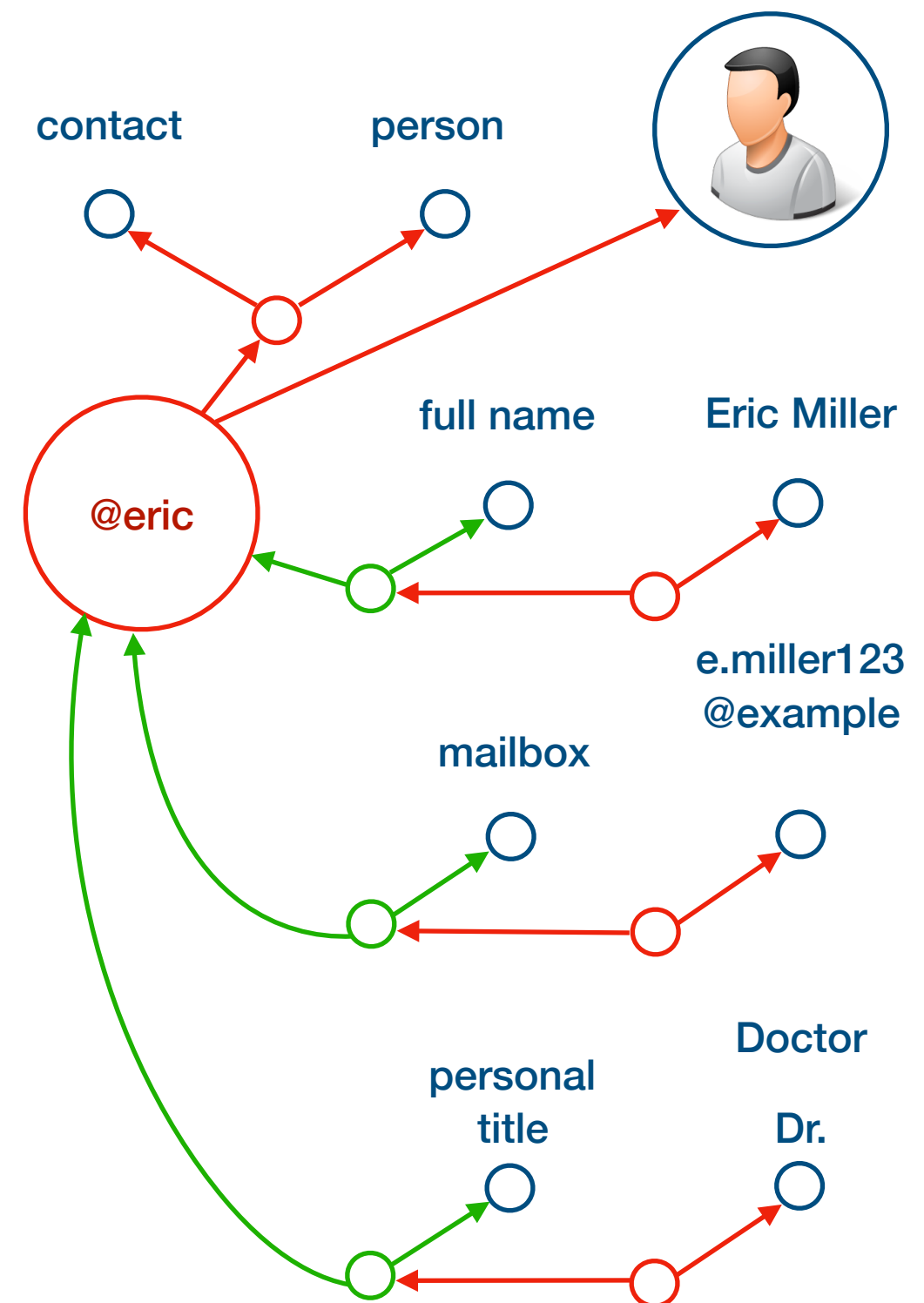
```
eric:me rdf:type contact:Person .
eric:me contact:fullName "Eric Miller" .
eric:me contact:mailbox <mailto:e.miller123@example> .
eric:me contact:personalTitle "Dr." .
```



### 3. Amorfis stores conceptual knowledge that can work with any application

Quality	Score	Description
<b>Expressive</b>	High	Recursive concepts
<b>Flexible</b>	High	Unlimited concepts & expressions
<b>Contextual</b>	High	Explicit
<b>Mutable</b>	High	Fully, with context
<b>Portable</b>	High	Fully

```
contact [  
  person [ @eric  
    - full name [Eric Miller]  
    - mailbox [e.miller123@example]  
    - personal title [Dr. | Doctor]  
  ]  
]
```



# Amorfs has unique features that set it apart from other data models

#	Benefit	Description	Example
1	<b>Abstraction</b>	Decoupling concepts from data helps capture all the different ways something can be represented (e.g. multiple languages, images, sound and vision).	“Dr.” and “Doctor” are explicitly identified as synonyms
2	<b>Context</b>	The context for associated information is explicitly defined making it easy to isolate and transport to another data store.	Contact details are linked to Eric in the context of being a “contact person”.
3	<b>Recursion</b>	Very fine grained meaning can be captured by nesting increasingly specific concepts.	“Contact” is narrowed down to “contact person” as opposed to “contact business”

*Amorfs structures are similar to neural networks making them an ideal foundation for cognitive processing*

# Amorfs poses challenges which are ideal for machine learning and AI solutions

#	Challenge	Description	Example
1	<b>Variability</b>	Many ways to represent the same information.	Is Eric a contact or a person? Which contact template to choose?
2	<b>Processing demands</b>	Processing graphical data is intensive.	In this example searching for “person” or “contact” both connect to “Eric Miller”
3	<b>Ambiguity</b>	Query results are probabilistic rather than true or false.	Is a doctor a person?

*The challenges are also strengths  
and solving them creates a next generation data platform*



# A-text is a data format that implements the Amorfs model for existing digital data

**JB HI-FI**

JB HI-FI - Belrose  
Tenancy 1.01 - 1.21, Belrose Super Centre  
Belrose, NSW, 2085  
Phone - 02 9450 4000  
TAX INVOICE - ABN 37 093 114 286

Tax Invoice

Number of Items - 1

Items	\$
*NETGEAR -R6400 AC1750 DUAL WIFI ROUTER 495787	199.00
SUBTOTAL \$ 199.00	
TOTAL PRICE \$ 199.00	
02 EFTPOS-VISA-MC - ONLI \$ 199.00	
#207533056-1	
CHANGE \$ 0.00	
GST Included \$ 18.09	

\* Indicates Taxable Items

Receipt No: 207533056-132

ANZ EFTPOS  
ANZ CUSTOMER COPY  
JB HI FI BELROSE  
TENANCY 1.01/1.21  
BELROSE SUPA CENTRE  
TERMINAL ID 00912013202

TERMINAL ID 00912013202  
VISA (C) CR  
5544  
PUR AUD \$199.00  
Visa Debit  
AID A0000000031010  
TVR 0000000000  
APSN 01 P00002 ATC 0210  
APPROVED AUTH 290302  
STAN 103818  
RRN 207533056-1  
15/04/18 10:16

0207533056 43615 132 14 15/04/18 10:16

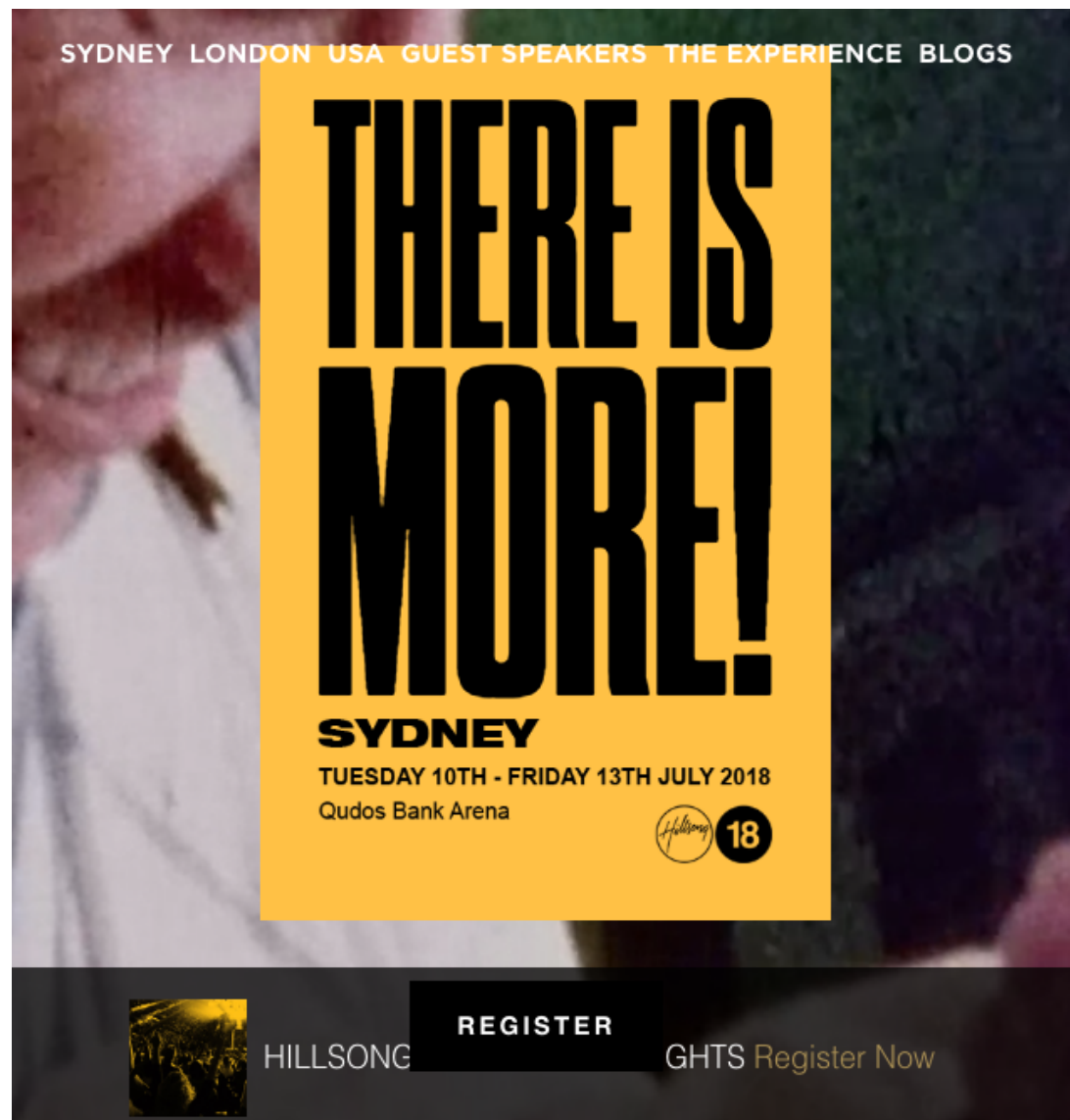
Thankyou for shopping at  
JB HI-FI Belrose  
Please retain receipt as proof  
of purchase.

207533056-132

#9213202AP7ULGAT77RO

```
"JB HI-FI"
+ store [Belrose
  - address [
    - street ["Tenancy 1.01 - 1.21, Belrose Super Centre"]
    - state [NSW
      + postcode [2085
        - suburb [Belrose]
      ]
    ]
  - ABN [37 093 114 206]
  - sales order [ {15/06/18 10:16}
    - item [NETGEAR R6400 AC1750 DUAL WIFI ROUTER
      + SKU [495787]
      + make [Netgear]
      + model [AC1750]
      - price [199.00]
    ]
    - subtotal [199.00]
    - total price [199.00]
    - payment [ {15/06/18 10:16}
      - amount [199.00]
      - payment method [ANZ EFTPOS
        - store name [JB HI FI BELROSE]
        - store address [TENANCY 1.01/1.21,
          BELROSE SUPA CENTRE]
        - terminal id [00912013202]
        - card provider [VISA]
        - card number [5544]
        - card type [Visa Debit]
        - purchase amount [199.00]
        - AID [A0000000031010]
        - TVR [0000000000]
        - APSN [01 P00002 ATC 0210]
        - approval [AUTH 290302]
        - Stan [103818]
        - RRN [207533056-1]
      ]
    ]
  ]
  - transaction id [0207533056 43615 132 14]
  - receipt code [#9213202AP7ULGAT77RO]
]
```

# An example of completely different information represented using A-text



```
church [Hillsong <hillsong.com>
- pastor [Brian & Bobby Houston]
- bible verse ["Seek and ye shall find"
  - book [Matthew] - chapter [7] - verse [7]
  - version [KJV]
]
- location [Sydney
  - campus [City, Hills, Bondi, Merrylands]
  - event [Hillsong Conference Sydney 2018
    - start date [10 July 2018]
    - finish date [13 July 2018]
    - venue [Qudos Bank Arena
      + address [
        + street [Edwin Flack Ave]
        + city [Sydney]
        + state [NSW]
        + postcode [2127]
      ]
      + location [Sydney Olympic Park]
    ]
  ]
]
- band <https://en.wikipedia.org/wiki/Band_(rock_and_pop)>
  [Hillsong United, Hillsong Worship, Young & Free]
]
```