Input to ORMS TC
Definitions and reference model proposals,
Use cases

Daniela Bourges Waldegg
dbw@zurich.ibm.com
Reputation definitions

- Reputation is a collective evaluation of an entity based on factual and/or subjective data about it, and is used as one of the factors for establishing trust on that entity for a specific purpose
  - Reputation can be viewed as a prediction of an outcome (an indicator that a certain outcome will occur)

- A reputation is a metric (a score, a rank, a state, a multi-dimensional profile)
  - associated to an entity: a person, a business, a digital identity, a website, a system, a device, a computing resource …
  - or associated to a pair [entity, attribute] (e.g. [person, skill])
  - in a particular defining space (e.g. a community, an application)
  - at a particular moment in time (reputations are dynamic)
Reputation definitions (cont’d)

- A reputation is computed using a reputation calculator, based on different types of input data (one or several of these), for example:
  - Static and dynamic characteristics of the entity: e.g. demographics, preferences
  - Data stemming from measurements and observations within the system: e.g. logs of entity’s past behavior, history of interactions, parametric data
  - “Real world” data about the entity: e.g. background checks
  - Inferred data about an entity: e.g. text analytics
  - Subjective data associated to the entity: e.g. ratings and feedback from peers, claims and endorsements

- The reputation calculator combines and weights one or more types of input data, according to a reputation algorithm and a context

- Notes on input data
  - Input data can be absolute (context-independent) or relative (context-dependent)
  - Quality and freshness of input data is key, and it should affect the way the data is weighted by the calculator
    - Reputation of the data source can also be used to infer input data quality (chained reputation)
General reputation model

- Input data collection/generation
- Observed data about entity E (e.g. behavior, interactions)
- Real world data about entity E (e.g. background checks)
- Subjective data about entity E (e.g. peer reviews)
- Inferred data about entity E (e.g. text analytics)
- Individual and demographic data for entity E

Context

Reputation calculator

Reputations of entities producing input data

Reputation of Entity E according to defining space

Entity analytics, Relationship scoring

Computation of trust by consuming party

Producer

Consumer

Defining space

Input data collection/generation

Real world data about entity E (e.g. background checks)

Inferred data about entity E (e.g. text analytics)

Subjective data about entity E (e.g. peer reviews)
General reputation model

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Portable reputation data

Reputation calculator

Context

Reputation of Entity E according to defining space

Computation of trust by consuming party

Producer

Consumer

Defining space
Reputation Management System (RMS)

- **A reputation management system may include mechanisms for:**
  - Collecting data about entities (generating data inputs or integrating external data feeds)
  - Computing reputations
  - Making sure the system is fair (e.g. provide bootstrapping mechanisms for new entities)
  - Performing actions based on reputations (e.g. trust computations)
  - Revoking reputations, allowing entities legitimate control over their reputation
  - Making sure the system is not abused (e.g. by social engineering) and reputations can be challenged (to satisfy legal requirements)
  - Making sure privacy of entities is respected (i.e. that the association entity-reputation is only disclosed to authorized parties)

- **Key requirements**
  - Governance
  - Security (abuse detection/prevention)
  - Privacy: control over access to reputations, privacy preservation for sources of input data
Characterization of reputation management systems

- A reputation management system has many dimensions, most of which are highly system-specific.
- Approach: look at use cases, detail some of the defining, individual elements according to reference model.
- Guiding questions: how to design reputation algorithms? How to represent reputations and associated data?

Encompassing system characteristics

- Domain of application
- Type of entities
- Type of metric
- Input data
- Contextual data
- Type of actions taken based on reputations

Requirements

- Privacy
- Security
- Governance

reputation management system (RMS)
Portable reputations - technologies and use cases

<table>
<thead>
<tr>
<th>Area</th>
<th>Examples (existing technologies, possible scenarios)</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated reputation systems</td>
<td>IBMr</td>
<td>Entities = [users, skills]</td>
</tr>
<tr>
<td></td>
<td>reputation broker</td>
<td>Input data = peer ratings</td>
</tr>
<tr>
<td>Virtual worlds</td>
<td>Reputations in SecondLife</td>
<td>Entities = avatars, objects, islands</td>
</tr>
<tr>
<td></td>
<td>Reputations for the SL Grid</td>
<td>Input data = peer ratings and behavior</td>
</tr>
<tr>
<td>Communities, collaboration spaces and social</td>
<td>Technical communities and open source development, Application reputation, Collective blogging, Open collaboration</td>
<td>Entities = users, skills, applications, projects, …</td>
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<tr>
<td>networking (Web 2.0)</td>
<td>platforms</td>
<td>Input data = peer ratings, history, behavior, inferred data,</td>
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<td></td>
<td>Lotus Bluehouse (collaboration platform where members are SMBs)</td>
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<td></td>
<td>Trust-based content filtering using portable reputations, Parental controls</td>
<td>Entities = users, systems (e.g. websites)</td>
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- Portability is intrinsic to use case
- Portability is necessary if system/community is opened
# Portable reputations - technologies and use cases (cont’d)

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| Retail and E-commerce        | Buyer and seller reputations,Service and product recommendations                                                                                                                                                                                     | Entities = Users, products, services, suppliers, …  
Input data = peere ratings, usage statistics, …  
*Portability is intrinsic to use case*                                                                                             |
| Enterprise applications      | Using reputation of data sources to resolve conflicting inputs in master data management                                                                                                                                                               | Entities = business objects, …  
*Portability is necessary if system/community is opened*                                                                              |
| Security, IT governance,     | Authorization/access control,IDS correlation, Information leakage detection,User & usage monitoring, device reputation,SPAM filtering based on reputation of IP addresses,Finding authoritative DNS servers                                                                 | Entities = users, applications, devices and device categories, widgets, systems, IP addresses, …  
Input data = history, usage statistics, …  
*Portability is intrinsic to use case*                                                                                              |
| systems management           |                                                                                                                                                                                                                                                      |                                                                                                                                 |
| “Real world” reputations     | Corporate reputation analyticsReputation-aware brokerage of financial services (reputation as aid in risk calculations), using reputations in call centers,Border securityBackground checks for trusted identities                                                                 | Entities = people, companies, brands, …  
Input data = text analytics, real word metrics (e.g. credit rating),…  
*Portability is intrinsic to use case*                                                                                              |
Extra material
Paul Resnick’s classic definition (2000)

- A reputation management system collects, distributes, and aggregates feedback about past behavior. A reputation system gives people information about others' past performance. It can enhance an on-line interaction environment by:
  - helping people decide who to trust;
  - encouraging people to be more trustworthy;
  - discouraging those who are not trustworthy from participating.

- Properties
  - Entities in the system must be long-lived enough to ensure expectation of future interaction.
  - Feedback concerning current interaction is elicited and distributed and must be visible in the future.
  - Feedback must have influence on the actions/trust of entities in the future.