Towards Run-time Monitoring of Web Services
Conformance to Business-Level Agreements

TAIC PART

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Literature Focus

- Web service monitoring received attention since 2003

- Check properties of Web services during run-time

- Great focus on the Quality of Service

- Need for blending existing approaches for creating more comprehensive monitoring solution

Example

- **MEDS** is a pharmaceutical company

  - MEDS receives direct orders from pharmacies

  - MEDS **outsources** the **warehousing** and the **distribution** to a third-party logistics (**3PL**) company

  - MEDS uses the WarehouseService provided by the 3PL to allocate a shipment of the items ordered
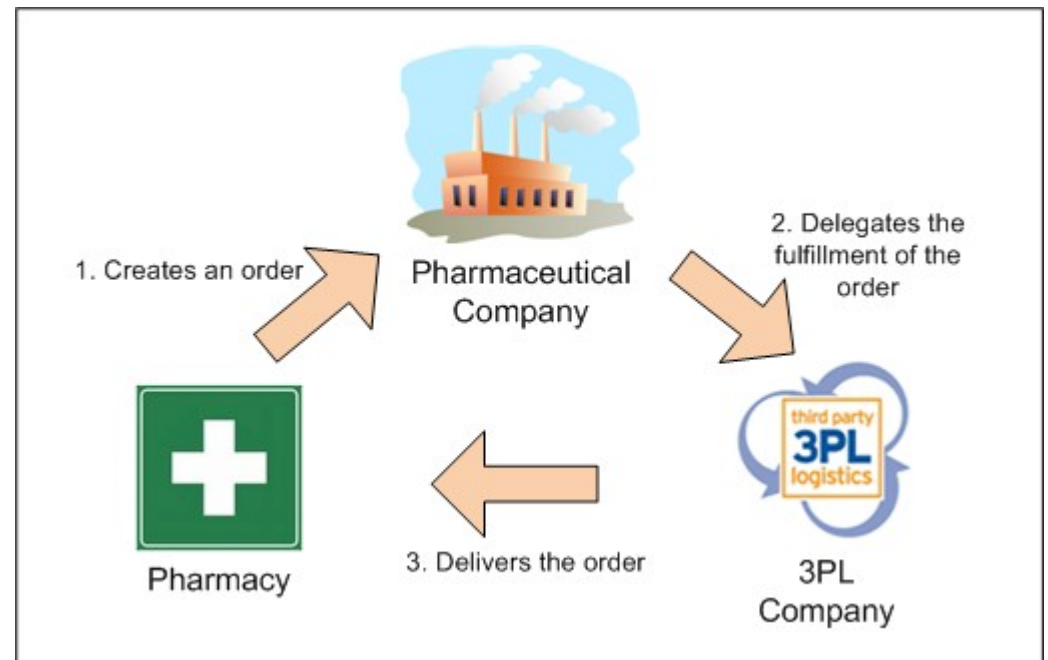
- MEDS has **realized** that the **operation** of its ordering handling system is **strongly depend on the services provided by the 3PL**

- MEDS **established** an Service-License Agreement (**SLA**) with the 3PL in order to have **guarantees** for the operation of the WarehouseService

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Example

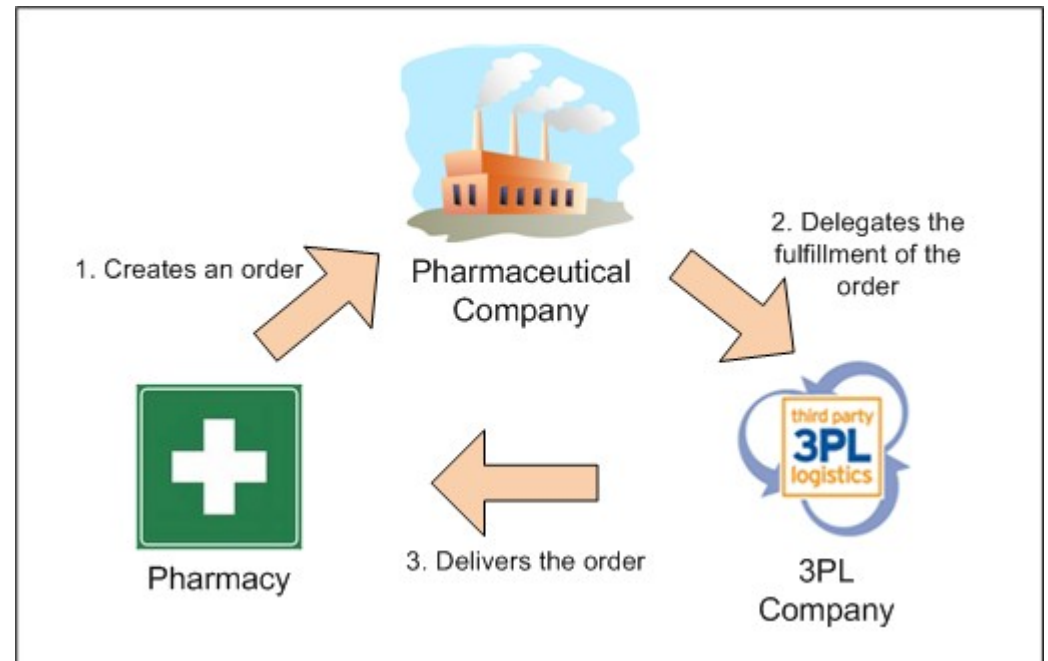- **SLA** for the WarehouseService

  - **Availability**:
    >=99%, 09:00 – 15:00

  - **Average Response Time:**
    <=200ms

  - **Error Rate:**
    0.005

1. Creates an order → Pharmaceutical Company
2. Delegates the fulfillment of the order
3. Delivers the order
Pharmacy
third party 3PL logistics
3PL Company
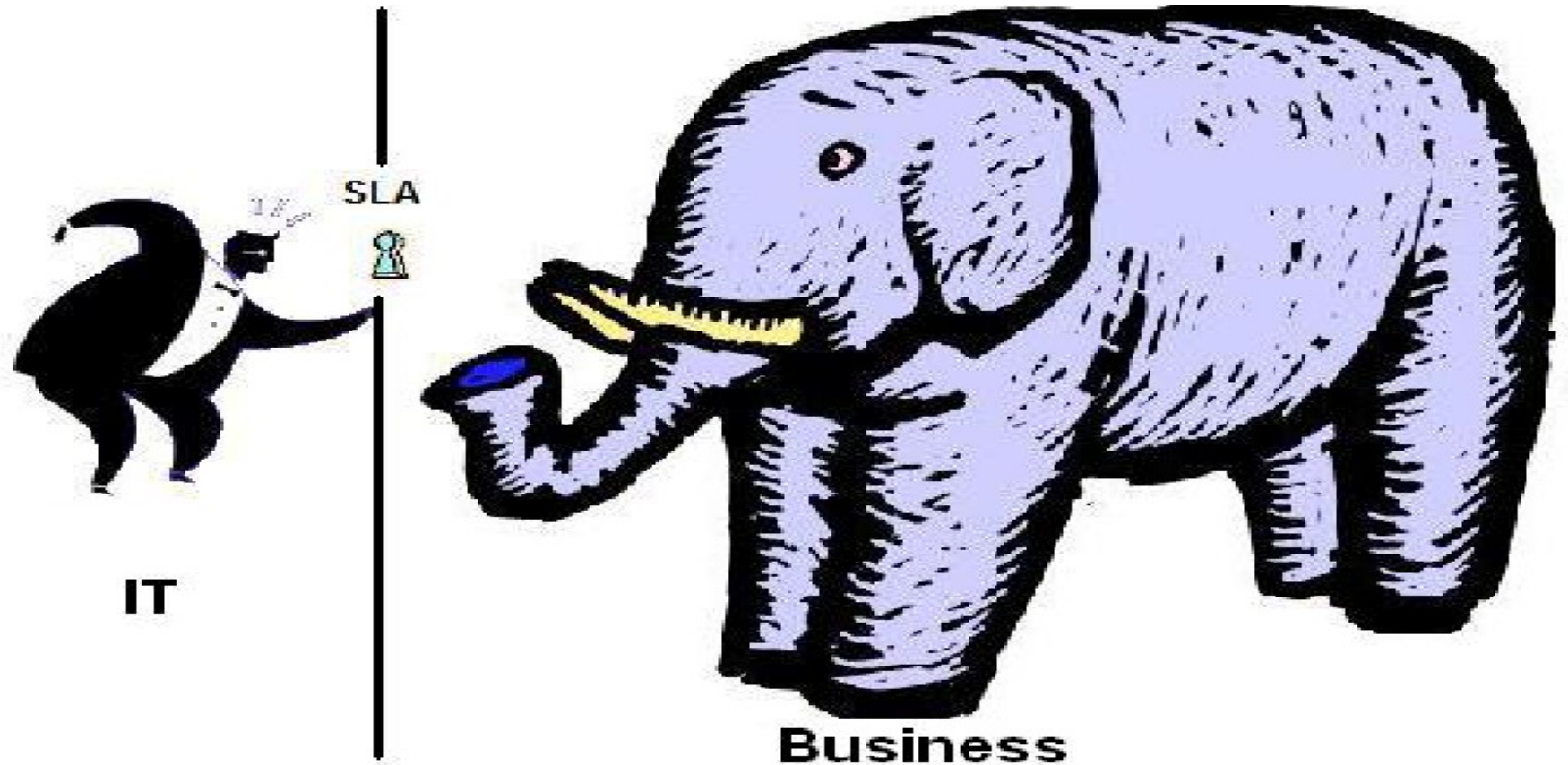
- For example, rather than promising 99% availability for a service, it would be possible to say that **the number of undelivered orders placed by a Pharmacy may not exceed 2 per month** in the WarehouseService

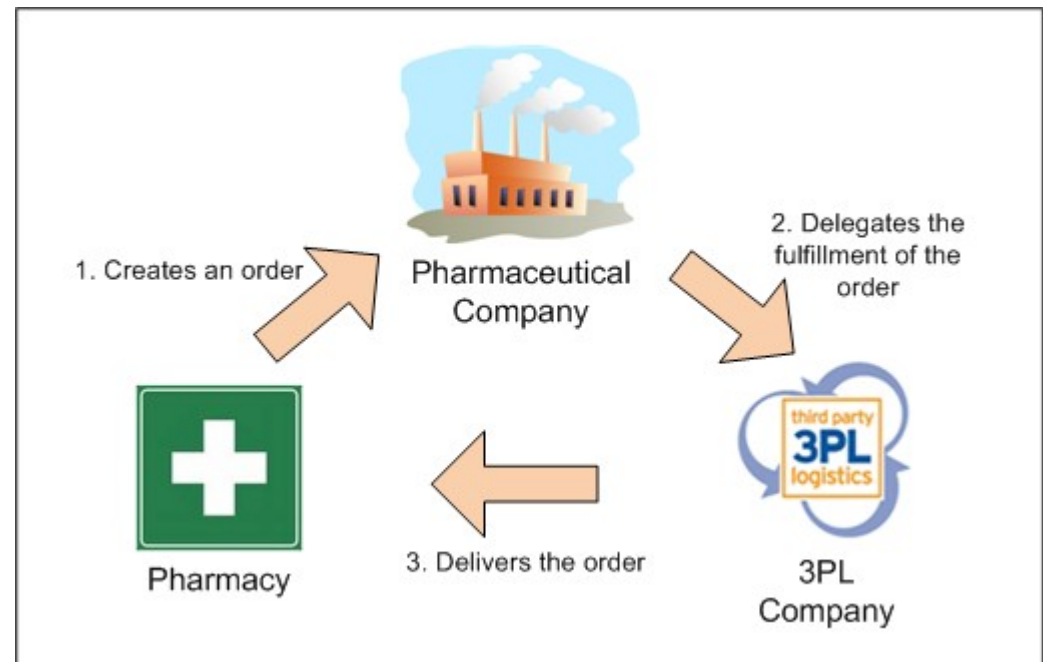# Looking at Business Through a Keyhole

[1]

Example

- **Business-Level Agreement (BLA)** for the WarehouseService

  - If ordered quantity > inventory quantity then ship the rest items and notify the pharmaceutical company

  - Number of orders fulfilled at least in a day = 5

  - Order fulfillment <= 3 hours

1. Creates an order → Pharmaceutical Company

2. Delegates the fulfillment of the order → third party 3PL logistics

3. Delivers the order → Pharmacy

3PL Company

- There is a clear **difference** between **SLA** and **BLA**

- **SLA** concerns agreements on the **availability** degree of a Web service

- **BLA** concerns agreements on **what** a Web service **does** and **how well** it **does** it

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Business-Level Agreement

- A **BLA** is a **contract** between a service **provider** and a service **consumer** that describes the agreed **functional** and **non-functional** requirements for a Web service

- A **BLA** is a **contractual** agreement between two **business partners** who will be **transacting business** using Web services [2] and it may **involve a human** in order for the activity to complete [3]

- A **BLA** concerns the agreement of higher **business goals**, thus it is created by business analysts, whereas an SLA concerns technical characteristics of a service

- A **BLA** could serve as a **complementary description** for Web services so that the **conformance** of the services to the **agreement** can be **checked** during **run-time**
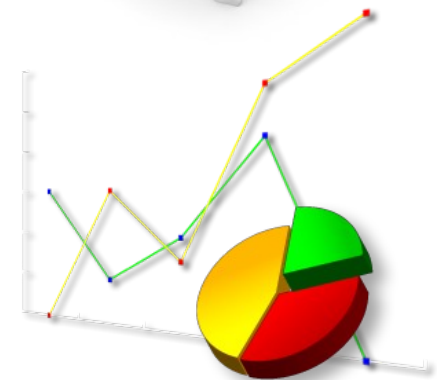
Necessity for Monitoring

- Dynamic **changes/upgrades** in implementation may unwittingly **break previous contracts** after testing is formally over

- Conditions at run-time may introduce **non-determinism** (particularly when sharing resources) that requires **monitoring** and **compensation at run-time**

- The existence of a **conformance monitoring** capability is a kind of **guarantee** for the consumer that redress is possible if a contract is **not honoured**

Monitoring Architecture

- Assuring conformance of a service to BLA at run-time requires support for **monitoring different aspects** at the same time

- Developed a framework to support the **monitoring of diverse aspects** of a Web service

- **Open architecture** with focus on adding **multiple monitors** dynamically at **run-time**

- Adhere to SOA principals such as **loose coupling, reuse and interoperability**
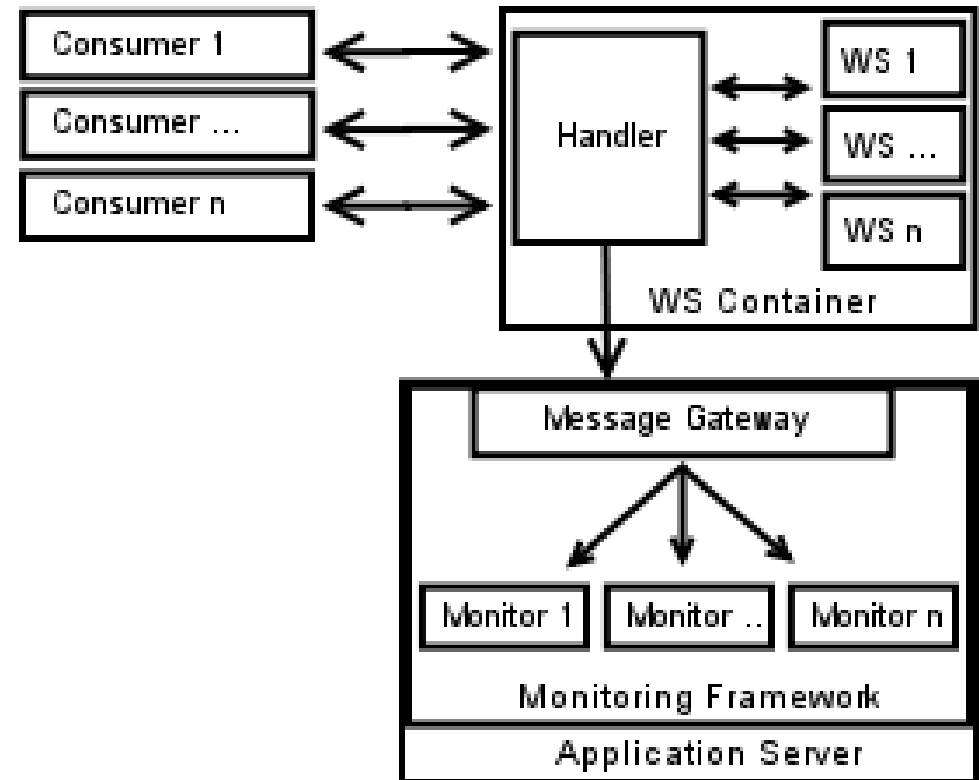
Future Directions

- Investigate the relation of **BLA** to Business Process Management (**BPM**), Key Performance Indicators (**KPIs**) and Business Activity Monitoring (**BAM**)

- Derive a **notation** that will facilitate the **creation of BLAs** from **business analysts**

- **Convert** the aforementioned notation to a **machine-readable representation** for automating tasks such as **monitoring**

- Develop the infrastructure and tools to support BLA in SOA

- Examine the **applicability** of BLA through realistic case studies

References

[1] Sauve, J.; Bartolini, C.; Moura, A.; , "Looking at business through a keyhole," Integrated Network Management-Workshops, 2009. IM '09. IFIP/IEEE International Symposium on , vol., no., pp.48-51, 1-5 June 2009

[2] H. Kreger, "Fulfilling the Web services promise," Communications of the ACM, vol. 46, 2003, p. 29.

[3] A. Sedighi and E. Johnson, "Classification of the Current Constraint and Capabilities Protocols in Describing Web Services," W3C Workshop on Constraints and Capabilities for Web Services, USA: W3C, 2004

Thank you

Discussion