Joint Workshop on Security Modeling ArchiMate Forum and Security Forum

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Joint Workshop on Security Modeling

ArchiMate Forum and Security Forum

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Standard Insurance Company

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Workshop Agenda

- Welcome and purpose
- Introductions
- Research spotlight: Strengthening RBAC with Responsibility Modeling
- Motivation: The *Inaction* Problem in Information Security
- Open Discussion:
  - Complementing TOGAF® and ArchiMate® with enhanced security modeling
  - Identification and prioritization of challenges
  - Next steps and adjourn

Workshop Purpose

- The acceptance and maturity of TOGAF and ArchiMate present opportunities to
  - Improve the conceptual and visual modeling of enterprise information security
  - Drive usage of TOGAF and ArchiMate for security architecture
  - Enable information security stakeholders to make *better decisions* about protecting their interests
  - Enable all business leaders to understand the impact of information security or the lack thereof
- We are here to identify and prioritize these opportunities, and to plan efforts to exploit them

Brief Personal Introductions

- Name
- Organization and position
- Involvement in The Open Group
- Security and modeling background and interests

Research Spotlight: Strengthening RBAC with Responsibility Modeling

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Outline

- Context of the research
  - The problem / the research approach
  - What is RBAC ?
  - Case study
- 1st research question: How should responsibility be modelled, both in general and specifically in ArchiMate ?
- 2nd research question: How can models of responsibility be used to improve access rights management ?
- Conclusions

The Problem

The research addresses two problems arising from security and governance requirements, such as Basel II and Sarbanes-Oxley

- Enterprises must **precisely** provision access rights according to business needs, principles such as least privilege and separation of duties as well as statutory requirements.
  - RBAC partially solves that problem
- Enterprises must precisely define **responsibilities** and stakeholders must understand them.
  - Today, there is no standard business definition of responsibility

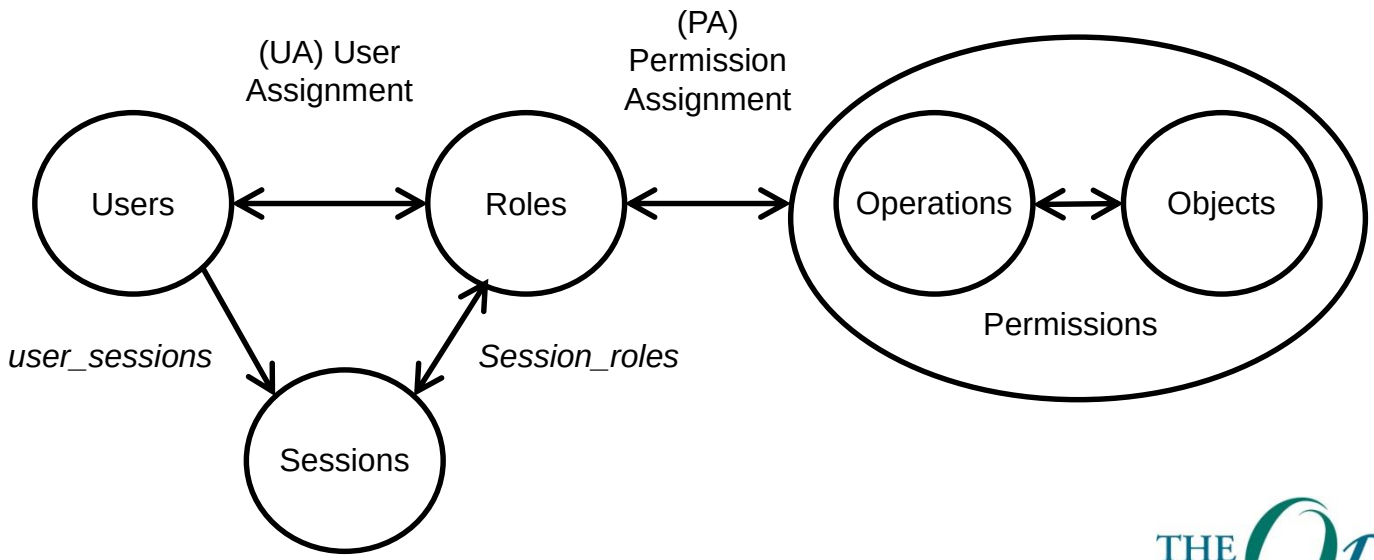
→ Both problems are linked: Responsibility definition enables precise provisioning of access rights

Approach

- In order to solve the problem:
  - We explore a model to define responsibilities
  - We consider access rights provisioning based on the model

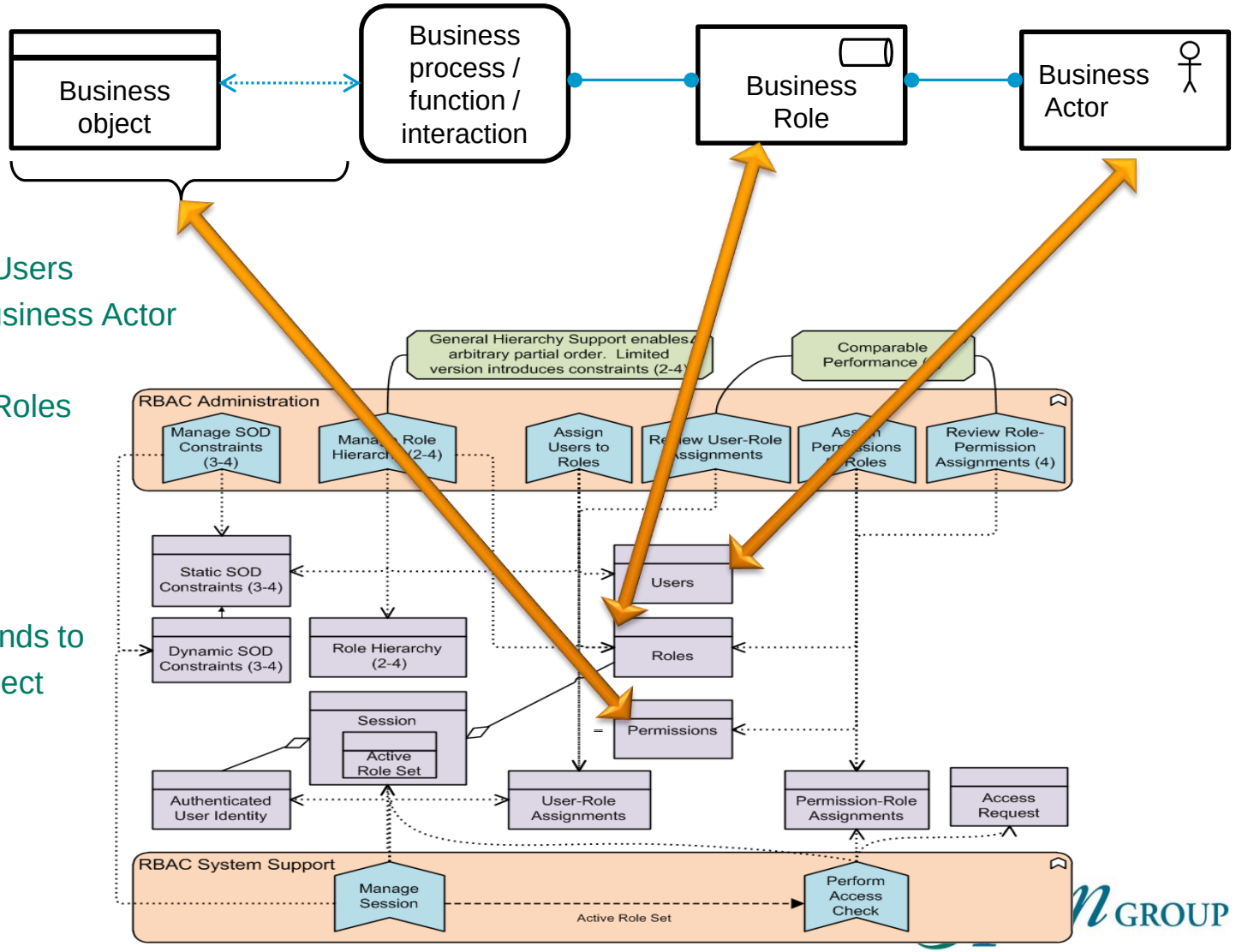
RBAC

- A widely implemented mechanism for protecting system resources. Relies on user authentication, which in turn relies on identity management
- Defines and applies relationships between
  - Users − often human, but can also be systems
  - Roles − job functions defined for an organization
  - Permissions − organizational consent to perform specific operations
- Ensures that each user can execute only those operations authorized through roles that are both assigned to that user and activated for that user's session
- Four standard and cumulative levels (hierarchical, constraint,…)

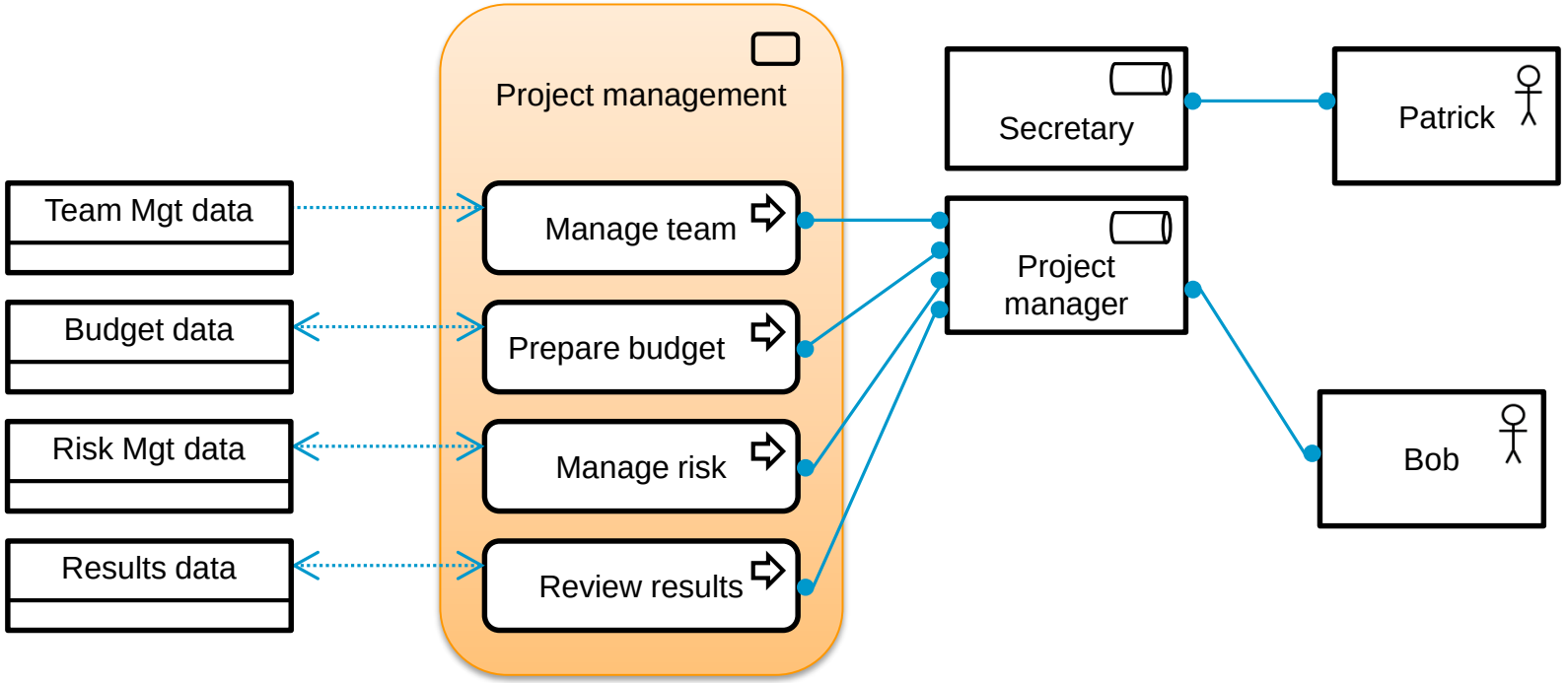


Administration framework

- The *data object* Users corresponds to the Business Actor
- The *data object* Roles Corresponds to the Business Role
- The *data object* Permissions corresponds to the access to data object

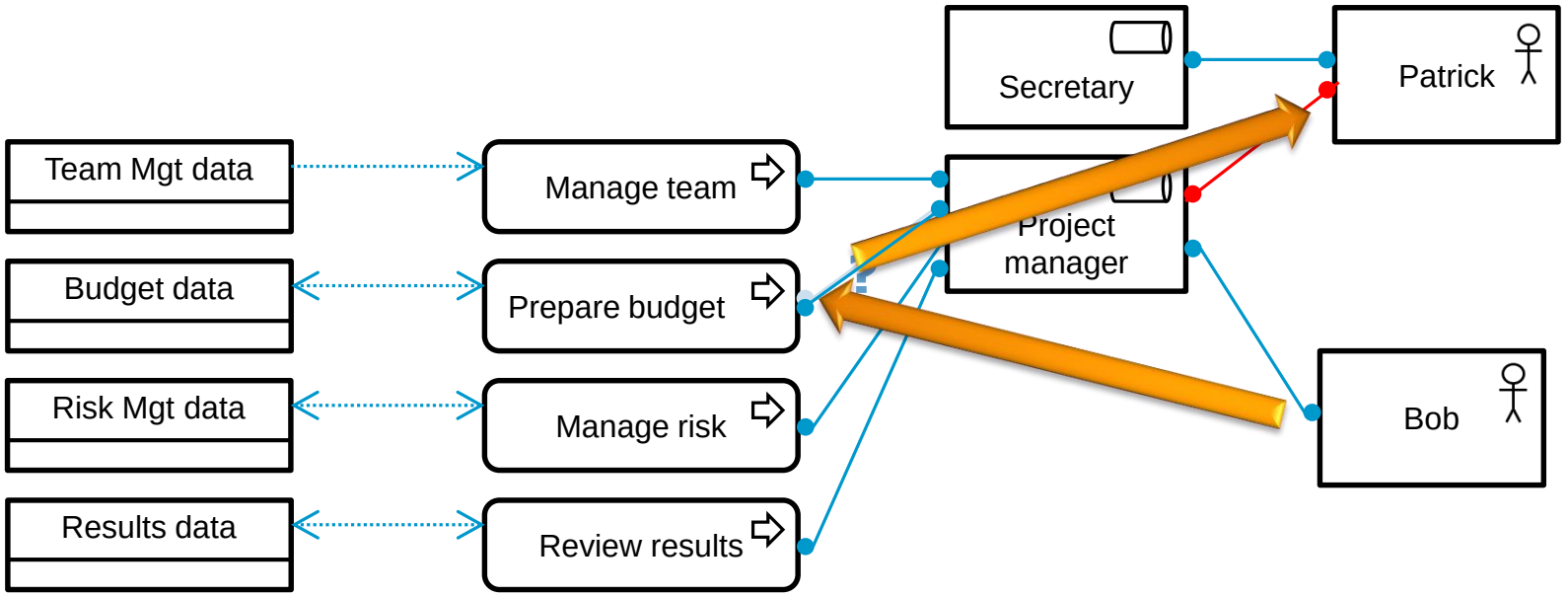


Case study



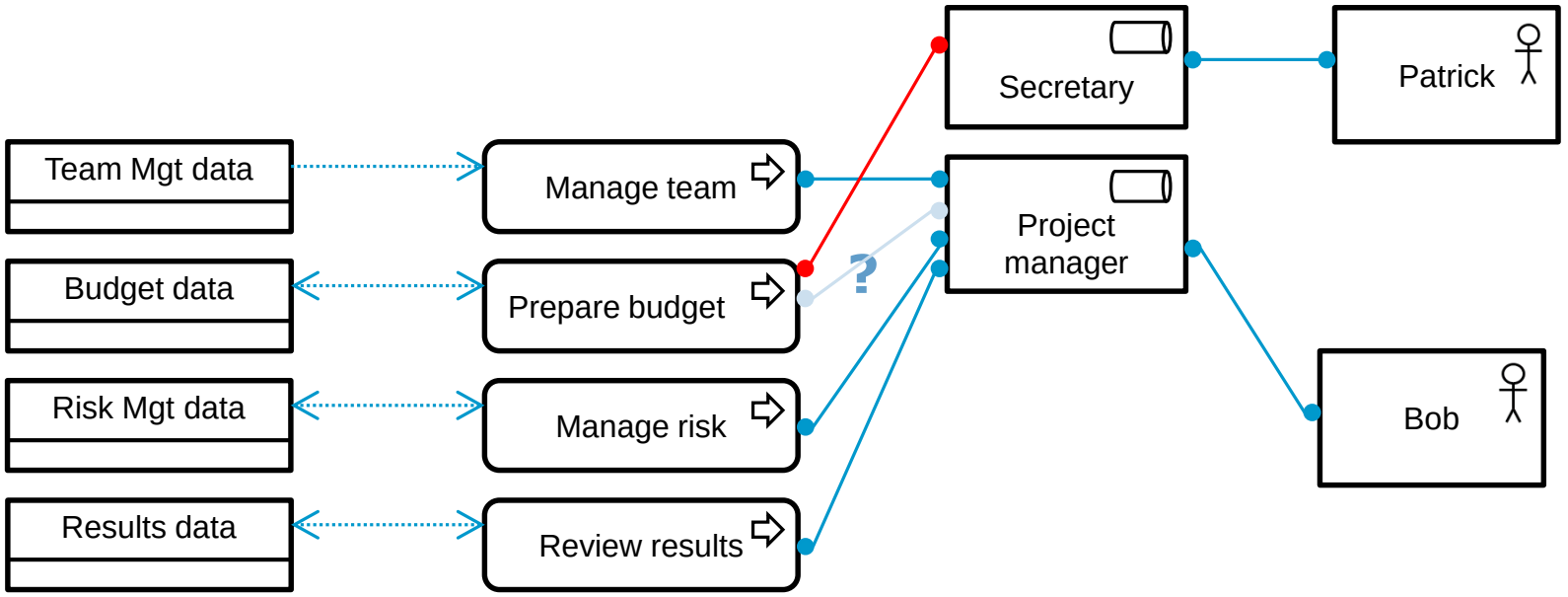
- The role of project manager is assigned to four processes that compose the project management service
- Each of these processes accesses specific data
- Bob is a project manager

Case study



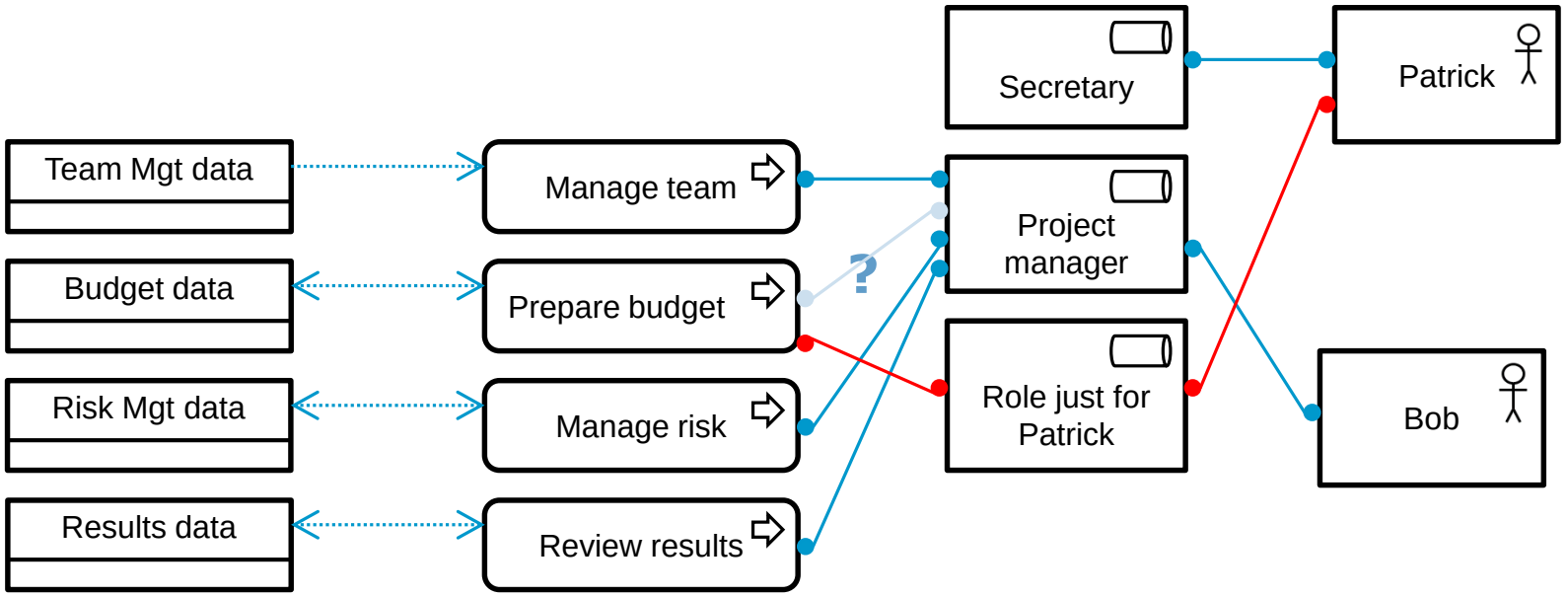
- Bob has too much work and delegates the preparation of the budget to his secretary, Patrick.
- → How can Bob assign Patrick the necessary rights?

Case study



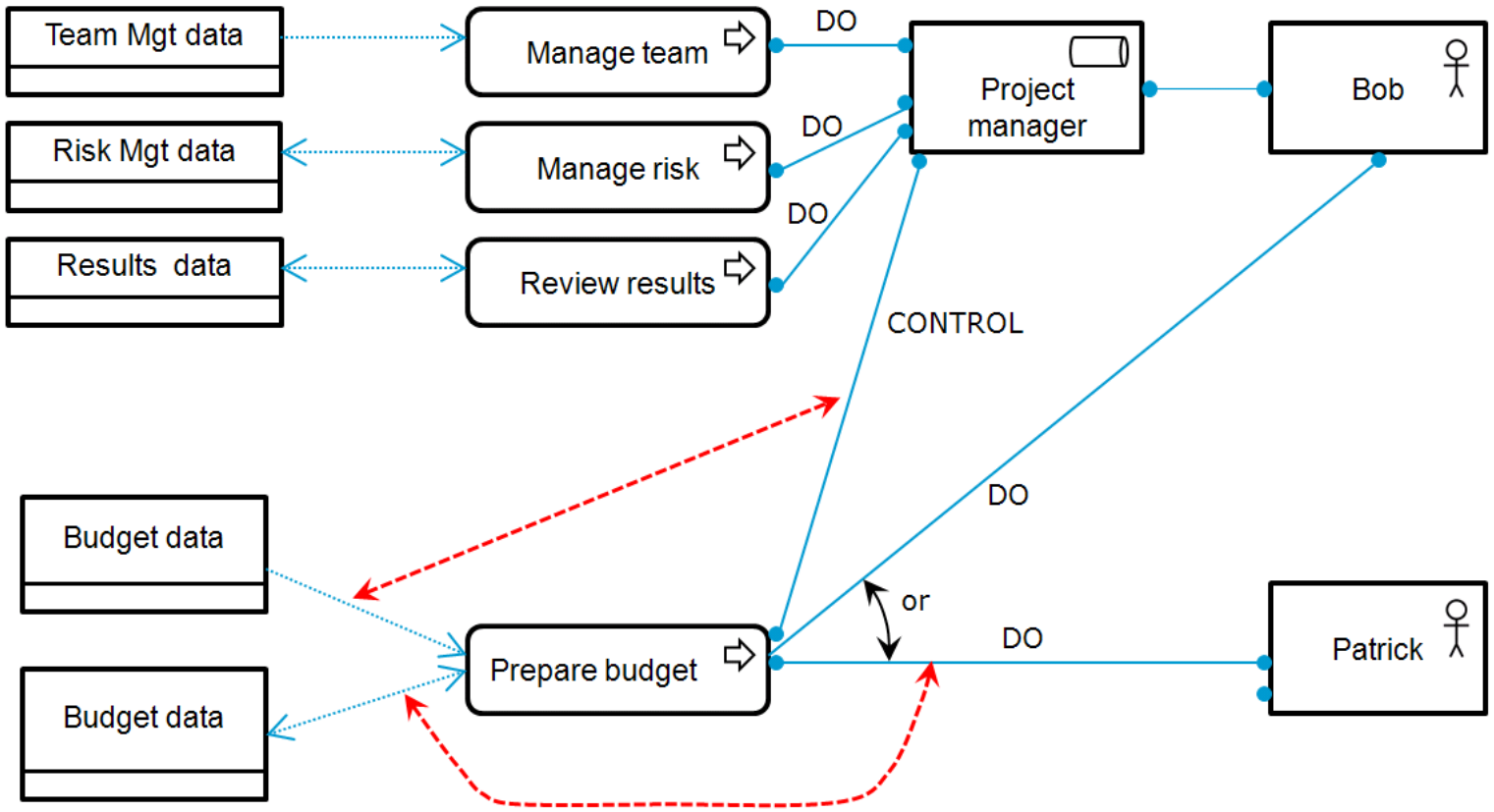
- In this model, the Secretary role is assigned to the Prepare Budget Process
- What happens to the other secretaries?
  → They receive too many rights

Case study



- In this model, Patrick gets a special-purpose role
- Is Patrick the only person who can manage the budget ?

What we need to model



Therefore, we introduce **RESPONSIBILITY**

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Responsibility Modeling

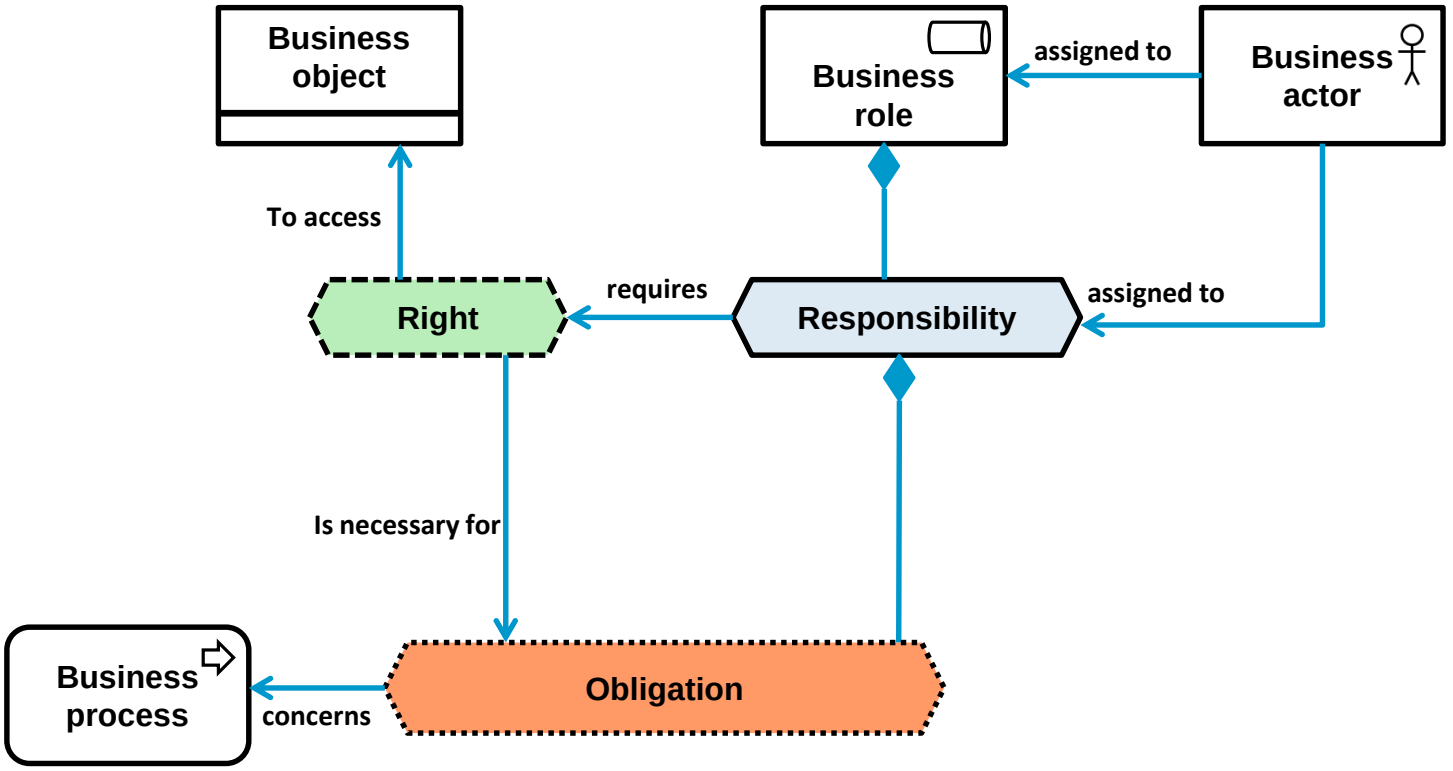
- How should responsibility be modelled, both in general and specifically in ArchiMate ?
  - New concepts
  - Relation between those concepts and ArchiMate

  → Illustrations with the case study

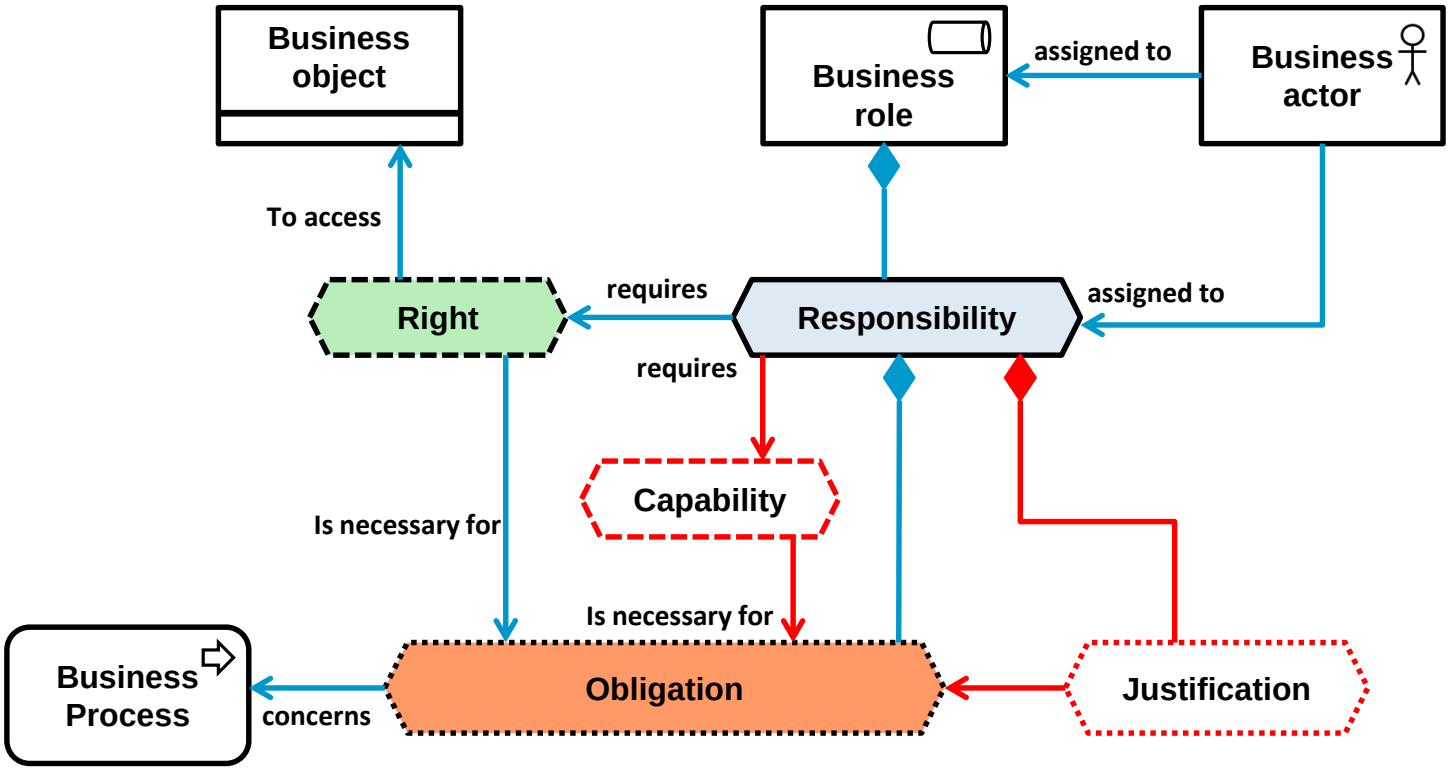
New Concepts

Name	Symbol	Meaning
Responsibility		A property assigned to a business actor that aggregates a set of obligations and rights
Obligation		An obligation is a duty to perform a task
Right		An ability granted to a business actor by the enterprise in order to enable the business actor to perform a specific task.
Capability		An ability of a business actor that has not been granted by the enterprise.
Justification		A justification is a duty to report and explain the action to a given authority

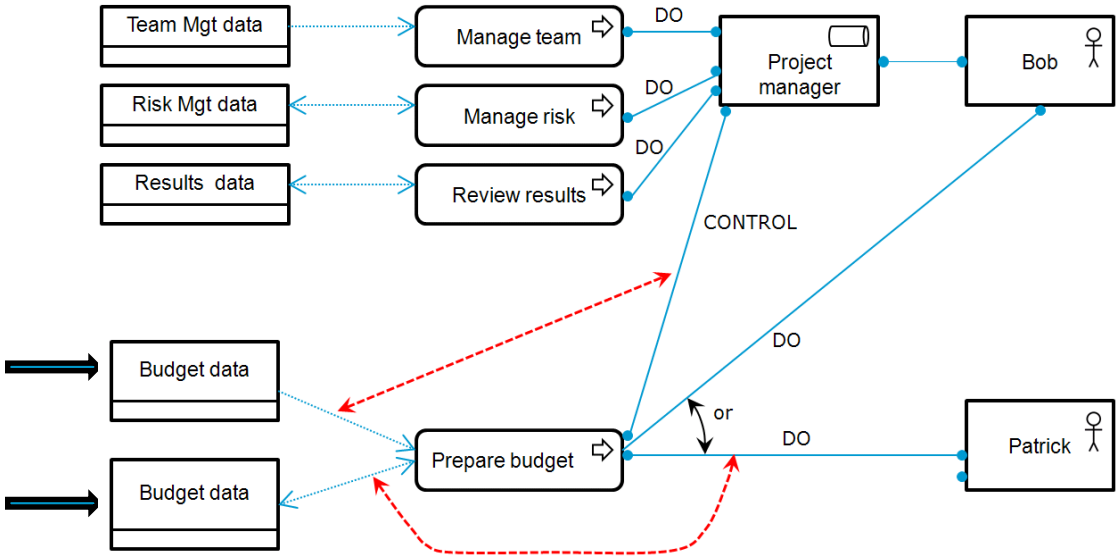
Responsibility Modeling

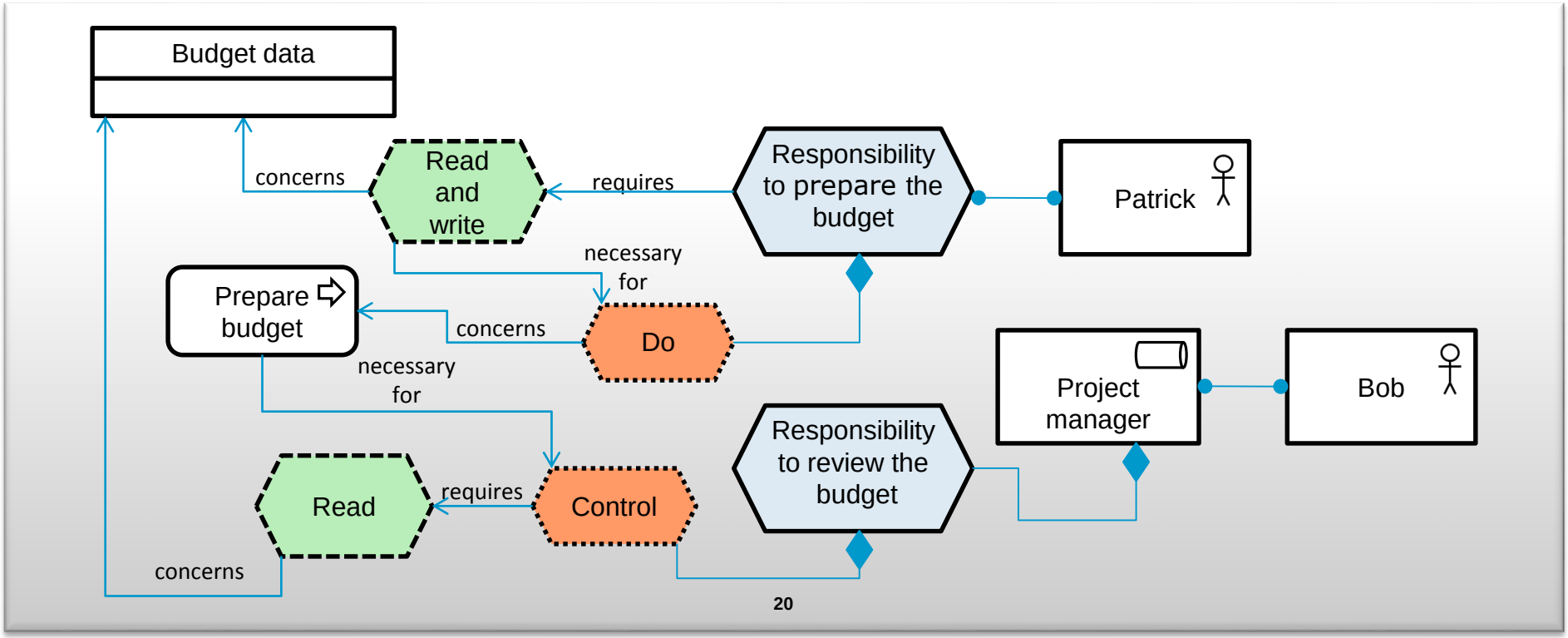


Responsibility Modeling



Responsibilities to perform and control the budget





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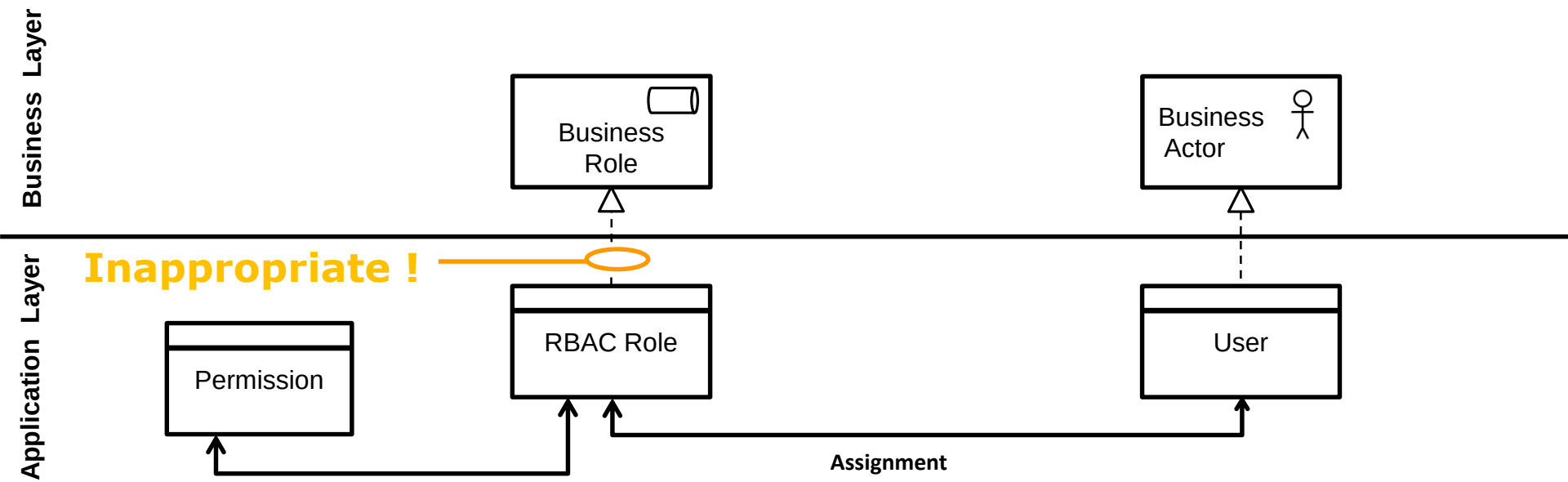
Second research question

- How to include the responsibility with RBAC and with RBAC administration framework ?

  - Introduction of the responsibility at the business layer and at the application layer
  - Association of the responsibility with the Business role and the RBAC role.

    → Illustration with the case study

Administrative Framework without Responsibility



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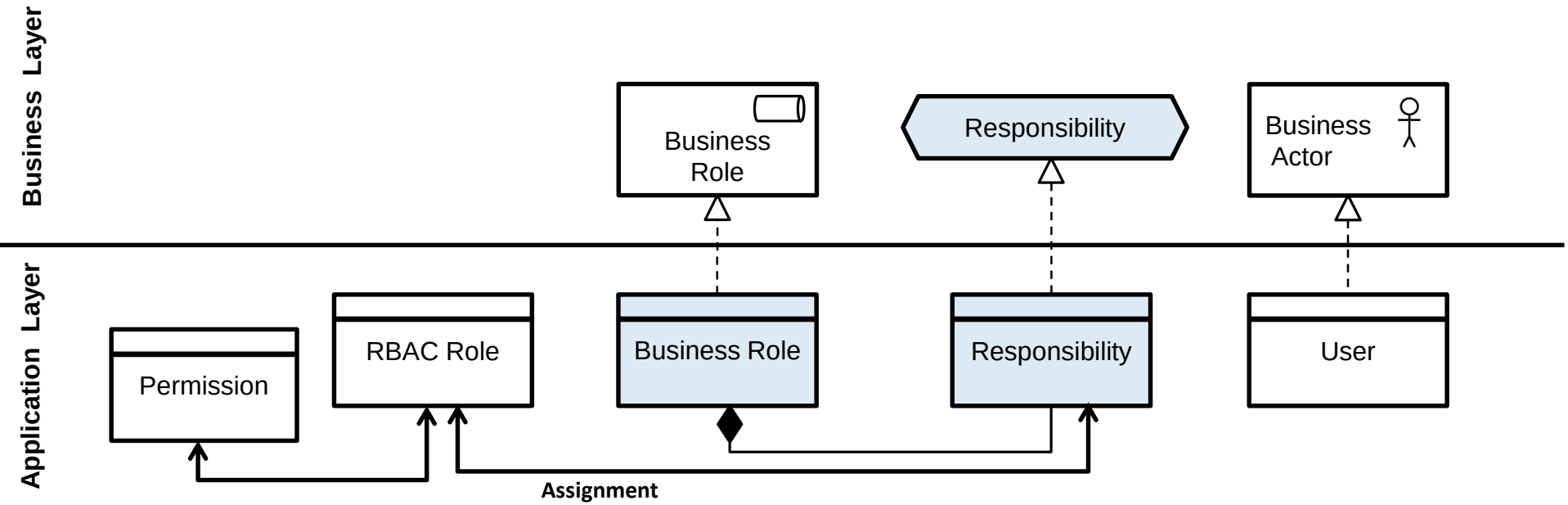
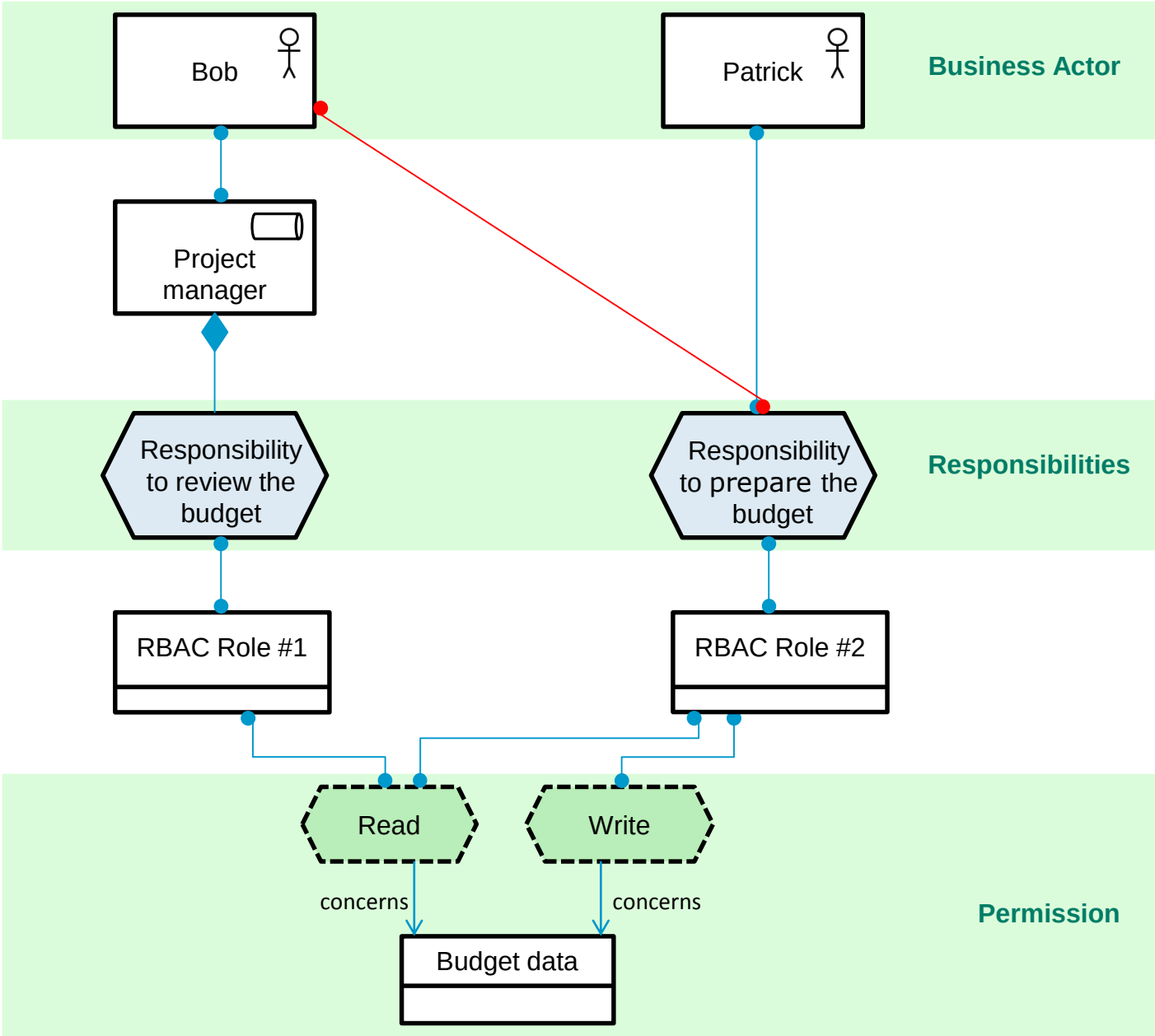
Administrative Framework with Responsibility



Case Study with Responsibility



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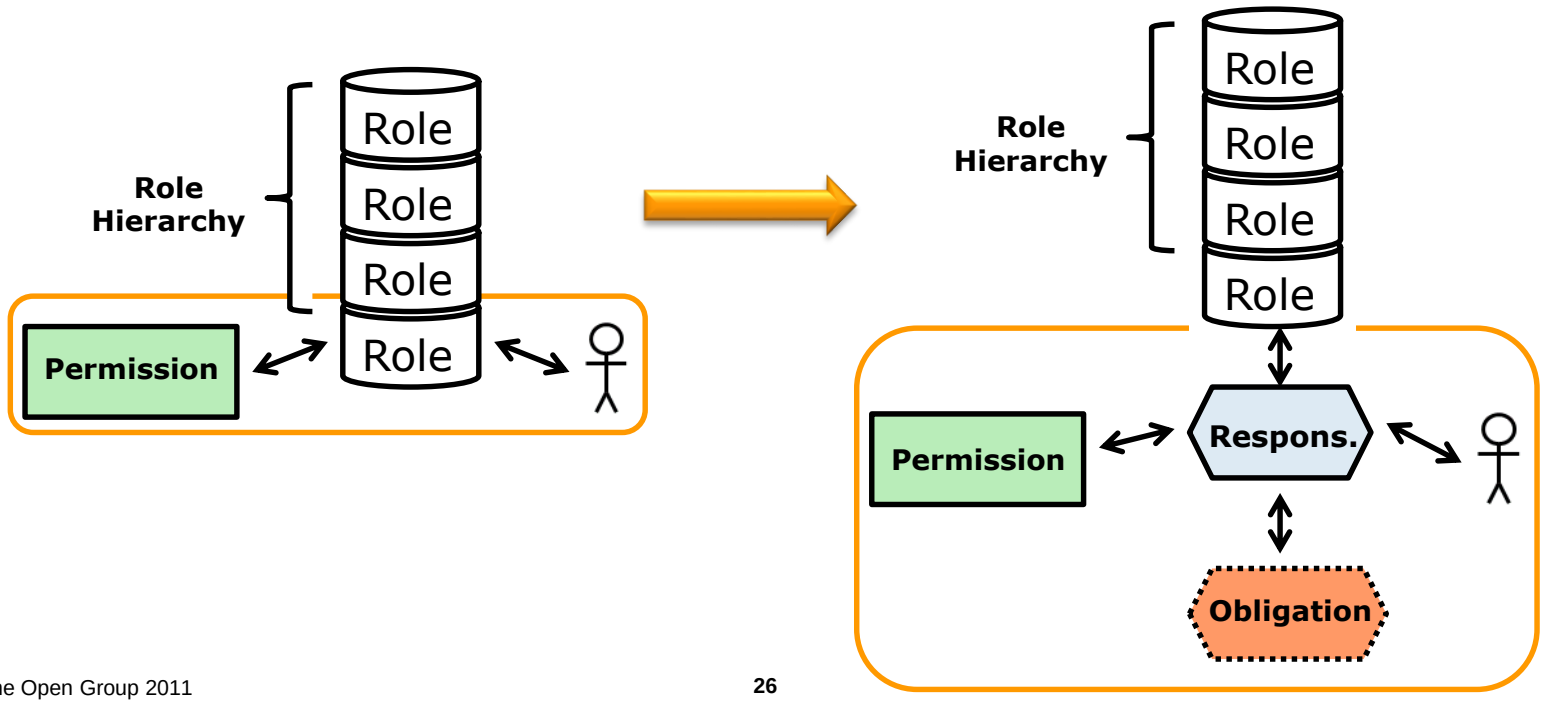
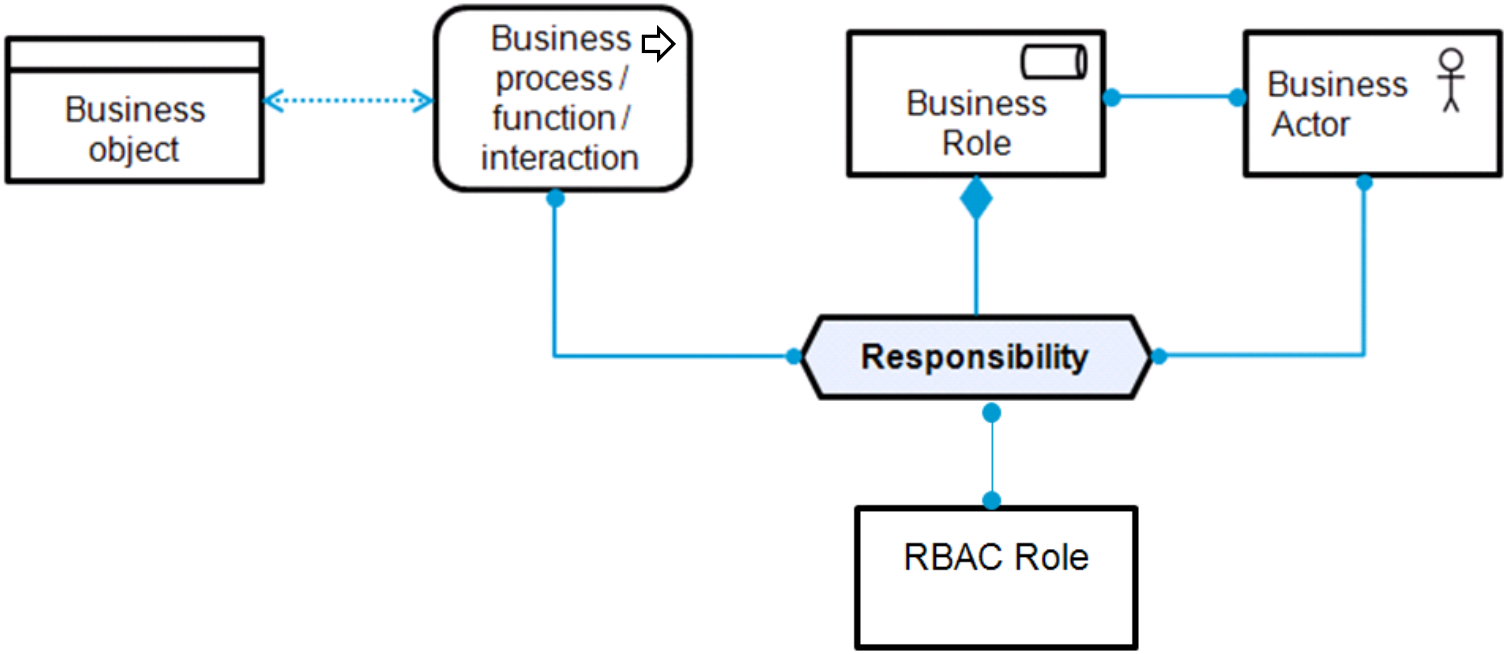
Conclusion

- In order to meet security and governance requirements, enterprises must precisely define responsibilities and provision access rights
- The proposed responsibility extension to ArchiMate enables this precision



Conclusion

- The **responsibility** concept aligns access rights between the ArchiMate Business and Application layers.



Motivation: The *Inaction* Problem in Information Security

Stakeholder Inaction Causes Great Harm

- According to an international study of 761 data compromise incidents in 2010[1]
  - 83% of victims were targets of opportunity, the same as 2009
  - 92% of attacks were not highly difficult, up 7% from 2009
  - 96% of breaches were avoidable through simple or intermediate controls, the same as 2009
  - 89% of victims subject to the Payment Card Industry Data Security Standard[2] had not achieved compliance

Why Don't Stakeholders Act?

- Economic explanations fall into categories such as[3]
  - Misaligned incentives
    - Breach victims often suffer more than individuals responsible for preventing breaches
    - Employees are often more motivated to do things quickly and cheaply than securely
  - Asymmetric information
    - Market participants are variously incented to exaggerate or minimize risk
    - Exaggerated claims about premium countermeasures make customers unwilling to pay extra for better security
  - Network Externalities
    - Embracing weak security often helps build market share
    - Early countermeasure adopters must often await broader adoption to realize benefits
  - Externalities of Insecurity
    - The social cost of asset compromise is often greater than the owners' cost

Why Don't Stakeholders Act?

- Security measures are always trade-offs, but our innate psychology causes us to misinterpret risk. Bruce Schneier[4] identifies five areas that we often get wrong
  - Risk severity
  - Risk probability
  - Risk impact
  - Effectiveness of countermeasures
  - Comparison of disparate risks and costs
- For example, we often[4]
  - Exaggerate spectacular but rare risks and downplay common ones
  - Have trouble estimating risks for anything outside our normal situation
  - Perceive personified risks as greater than anonymous risks
  - Underestimate risks we willingly take or have some control over, but overestimate risks we can't control
  - Overestimate risks that are receiving great publicity, that are new, or are man-made relative to risks that are less publicized, commonplace or natural in origin

Why Don't Stakeholders Act?

- We are much better equipped to address imminent threats versus those looming in the distance. As Schneier[4] says
  - *"We are very well adapted to dealing with the security environment endemic to hominids living in small family groups on the highland plains of East Africa"*
- In fact, our "Abstract concepts are largely metaphorical"[5]. For example, we
  - *Punch a hole* in the firewall
  - Experience security *breaches*
  - Analyze attack *surfaces*
  - All too often, end up between a *rock and a hard place*

Questions for Discussion

- How can security architects use the ArchiMate visual modeling language to
  - Align stakeholders' *perceptions* of risk with the logical and mathematical *reality* of enterprise risk?
  - Enable the sponsors, designers and implementers of controls to make the best possible protective decisions for their enterprise?
- How can The Open Group build on ArchiMate 2.0 to better support security architecture?

Thank You!

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Supplementary Material

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