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Joint Workshop on Security Modeling ArchiMate Forum and Security Forum

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Publication date:
2012

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Citation for published version (HARVARD):

Feltus, C & Band, I 2012, *Joint Workshop on Security Modeling ArchiMate Forum and Security Forum*.

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Joint Workshop on Security Modeling

ArchiMate Forum and Security Forum



Facilitators:

Erik Proper, Senior Research Manager and
Christophe Feltus, Senior Research Engineer,
Public Research Center Henri Tudor

Iver Band, Enterprise Architect,
Standard Insurance Company

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

The *Open Group* Conference,
San Francisco, USA, Feb 2, 2012

Sponsored by



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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

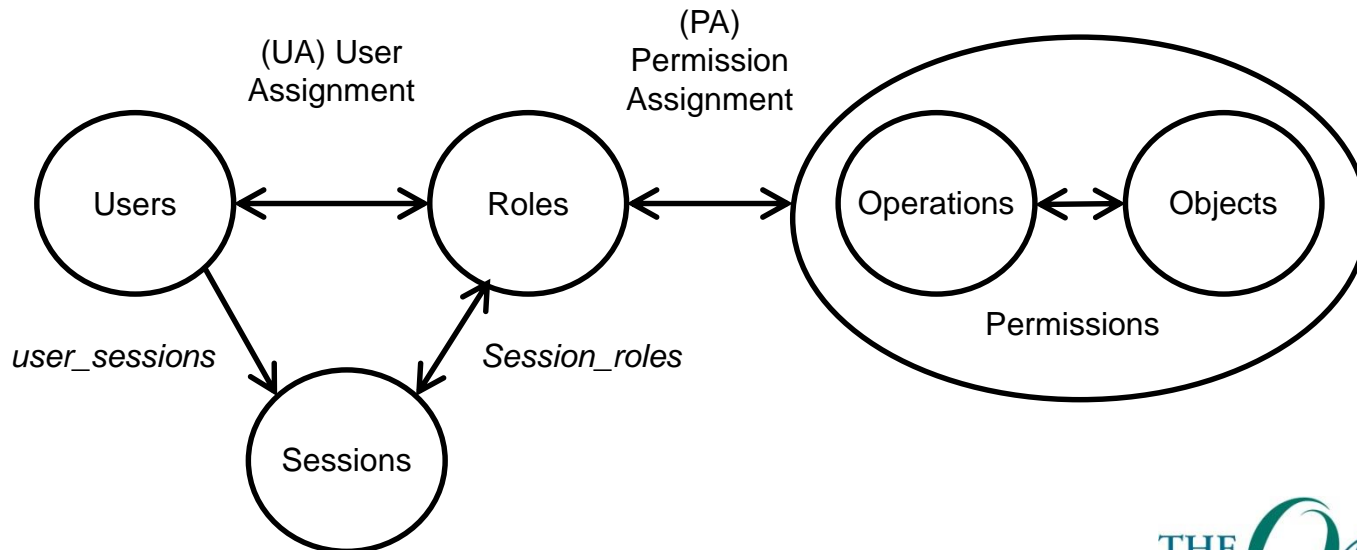
Approach

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

RBAC

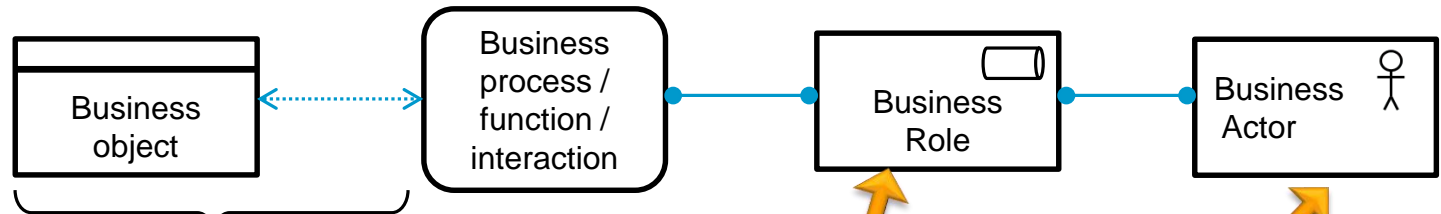
Modeling RBAC with SABSA, TOGAF and ArchiMate, Creating a Foundation for Understanding and Action, Iver Band, CISSP
Open Group Conference, Austin, Texas

- 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

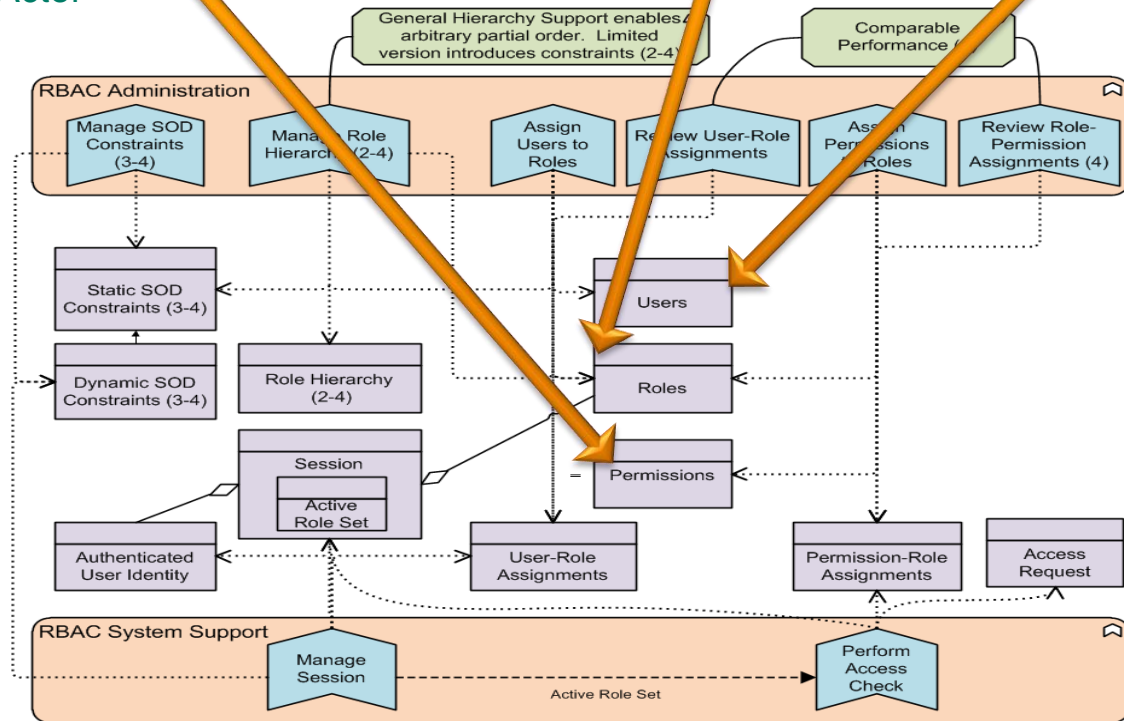
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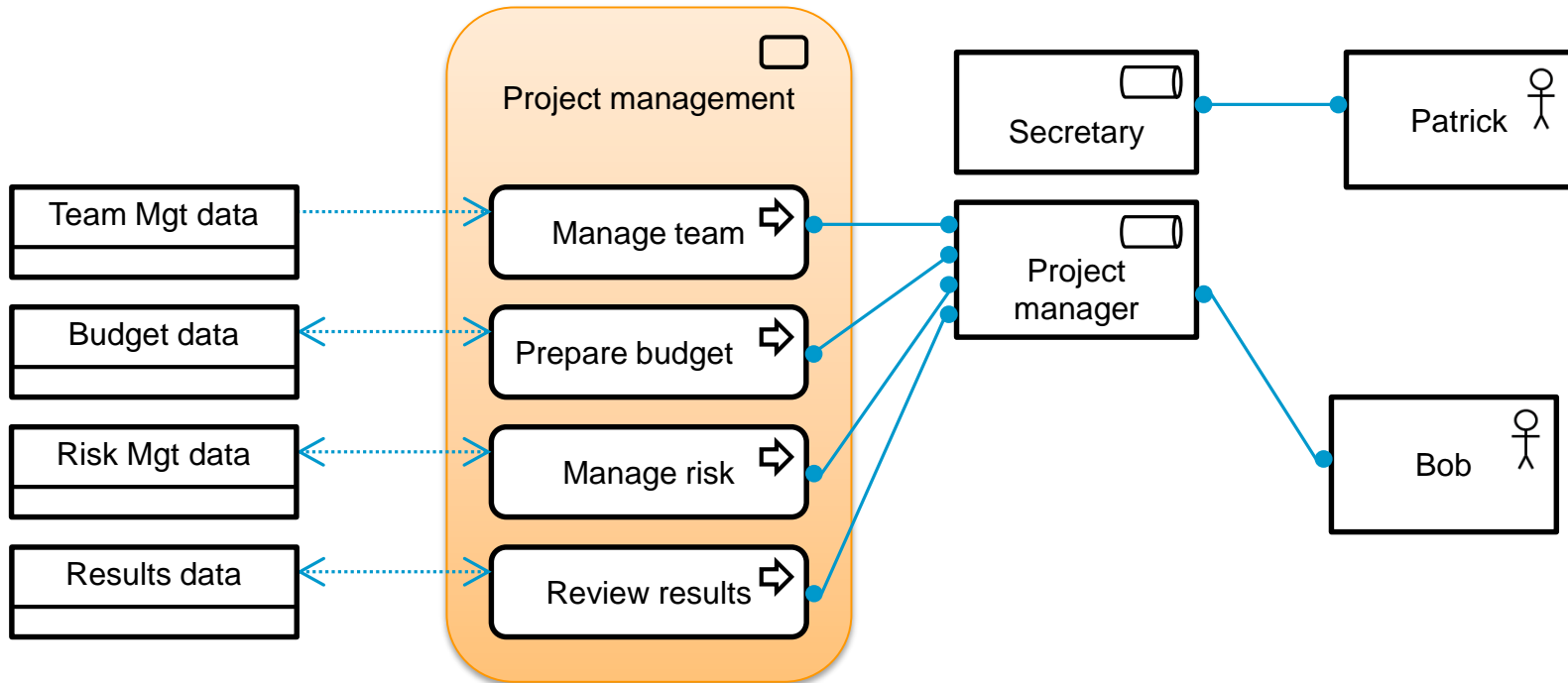
- The *data object* Users corresponds to the Business Actor

- The *data object* Roles corresponds to the Business Role

- The *data object* Permissions corresponds to the access to data object

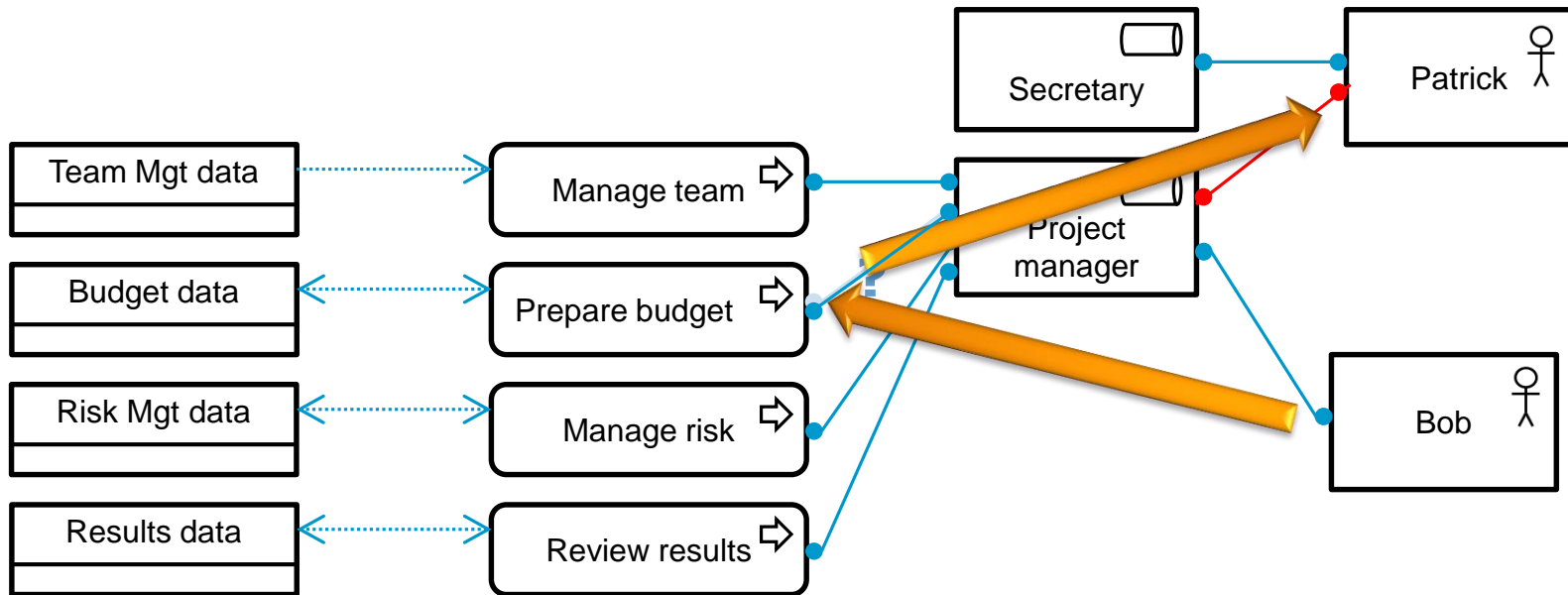


Case study



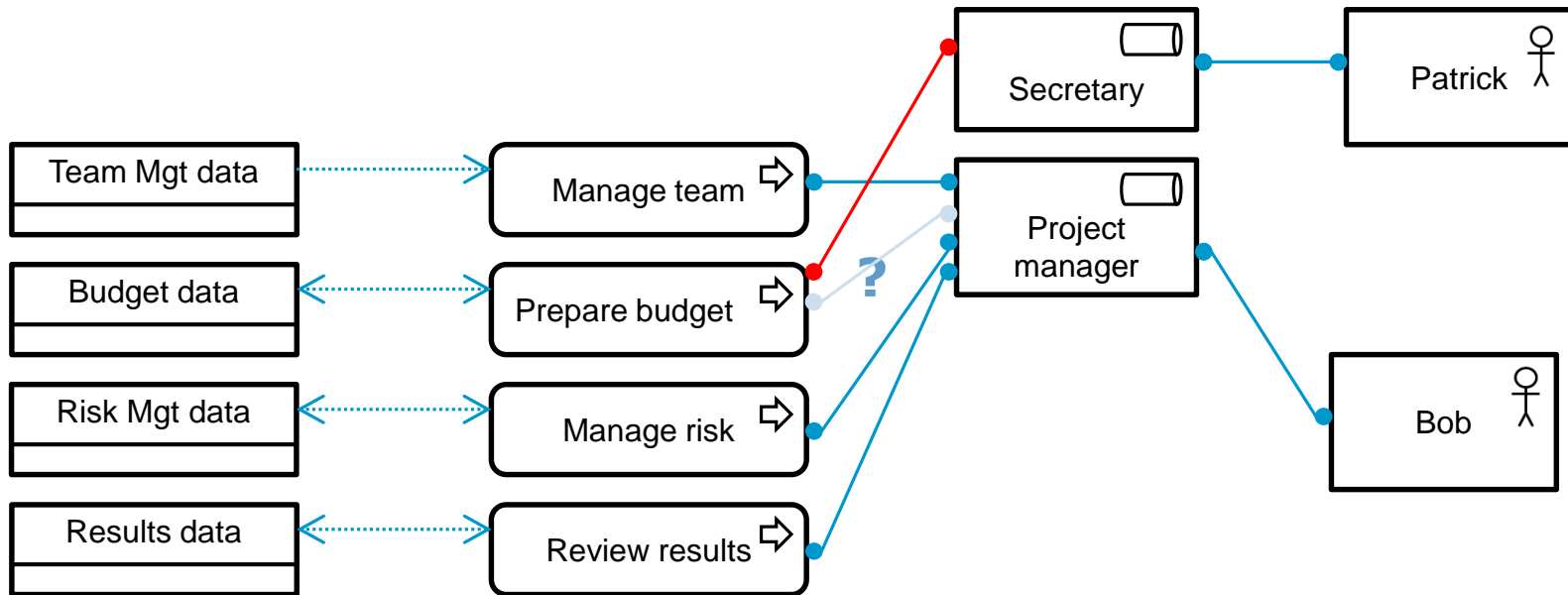
- The role of project manager is assigned to four processes that compose the project management service
- Each of these processes **accesses specific data**
- Bob is a project manager

Case study



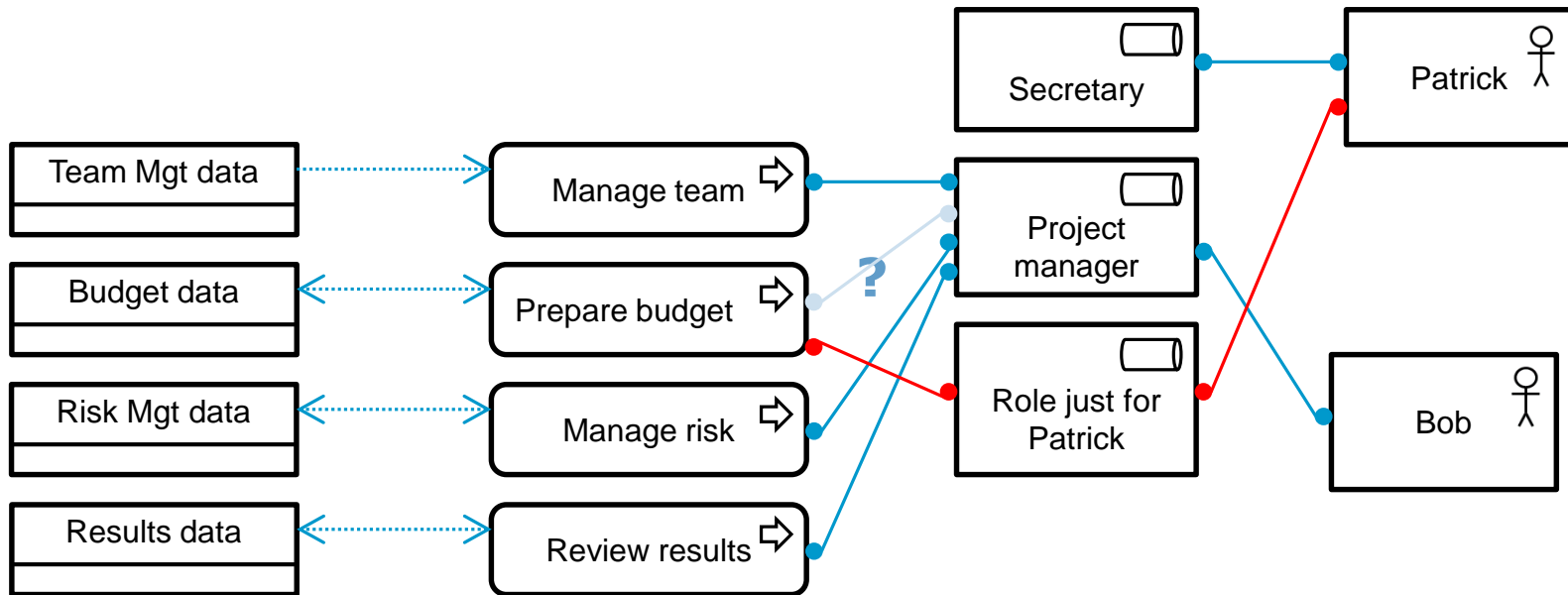
- Bob has too much work and delegates the preparation of the budget to his secretary, Patrick.
- → How can Bob assign Patrick the necessary rights?

Case study



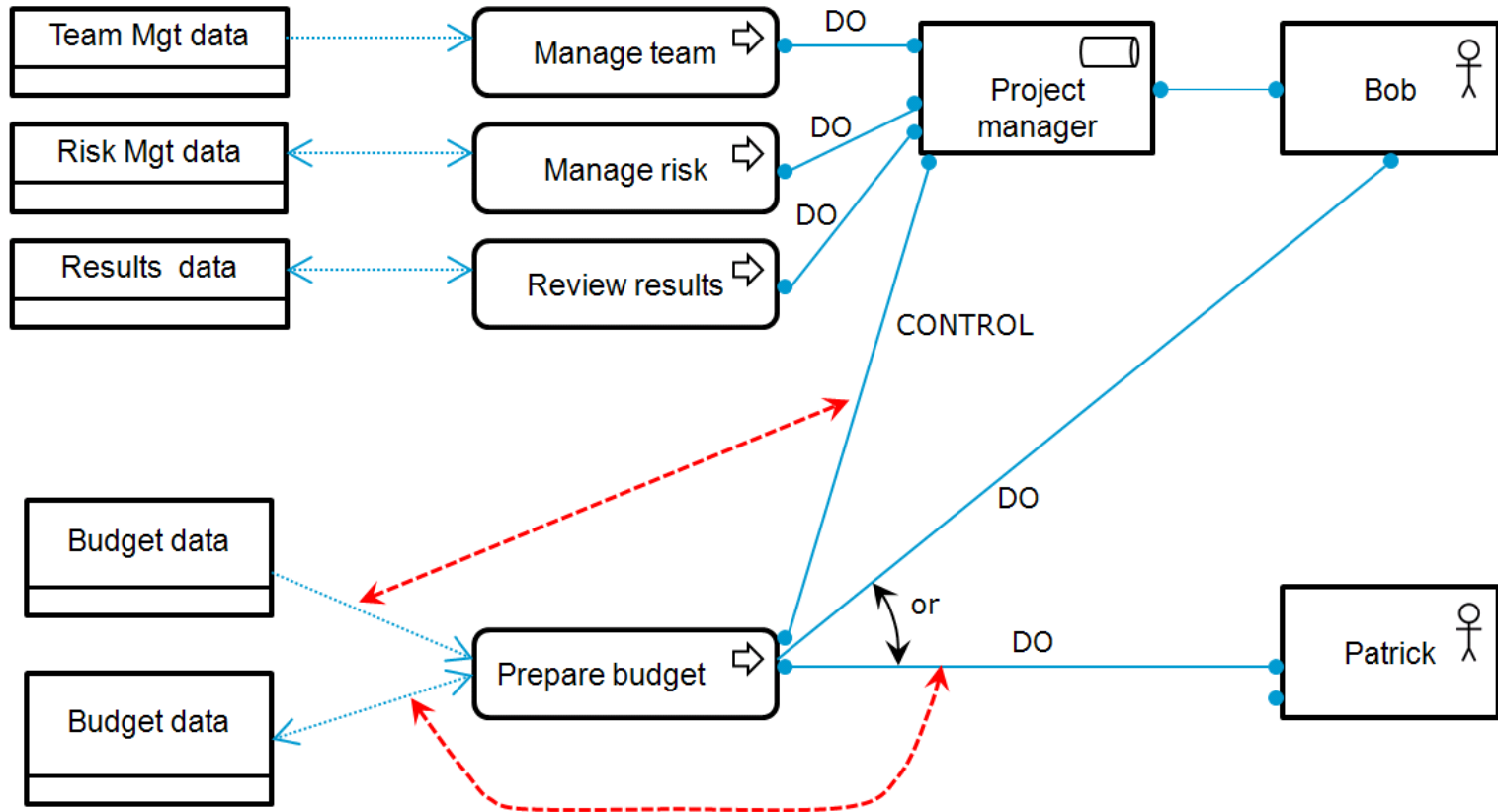
- In this model, the Secretary role is assigned to the Prepare Budget Process
- What happens to the other secretaries?
→ They receive too many rights

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



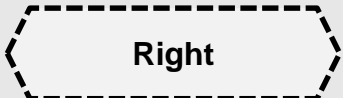
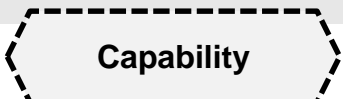
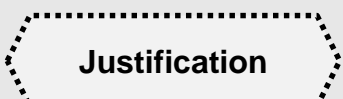


Therefore, we introduce **RESPONSIBILITY**

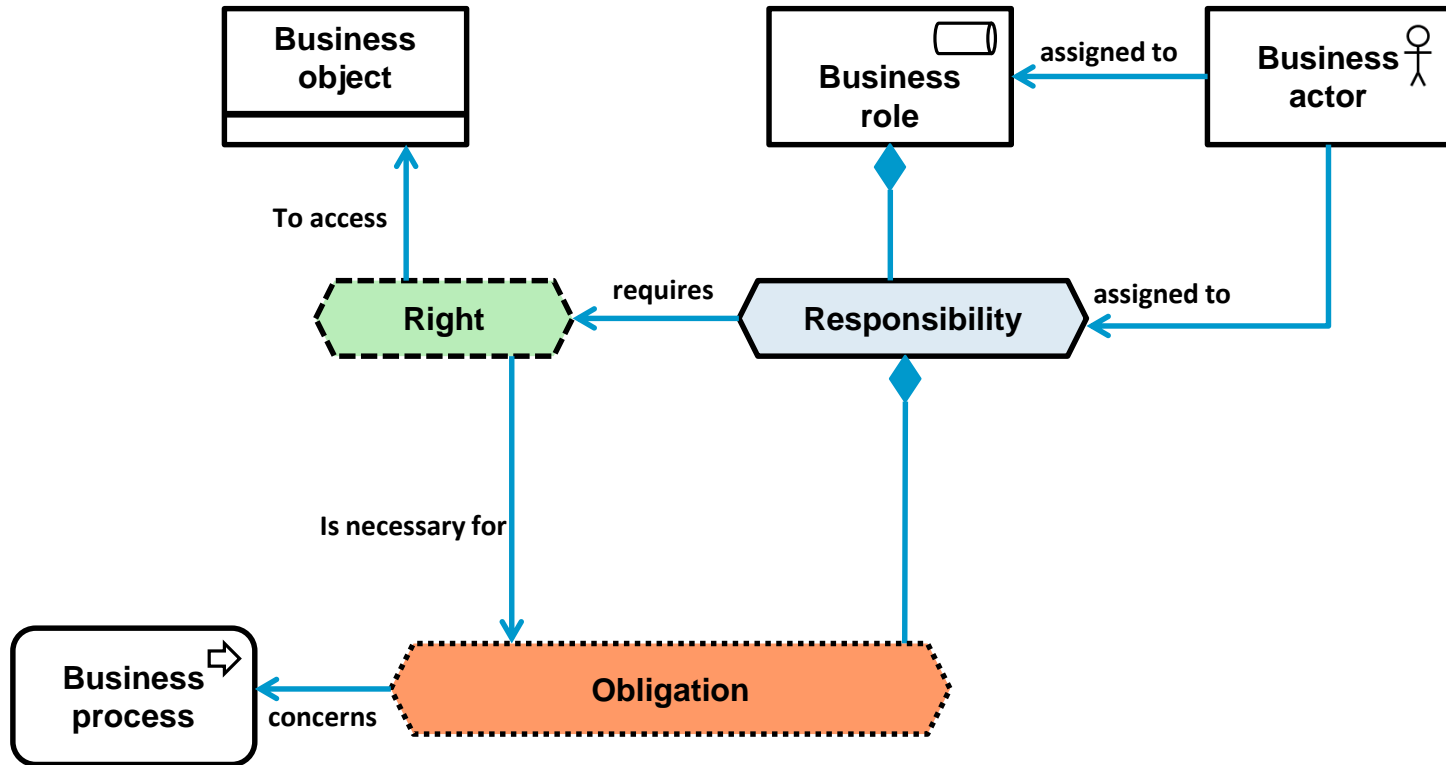
Responsibility Modeling

- 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

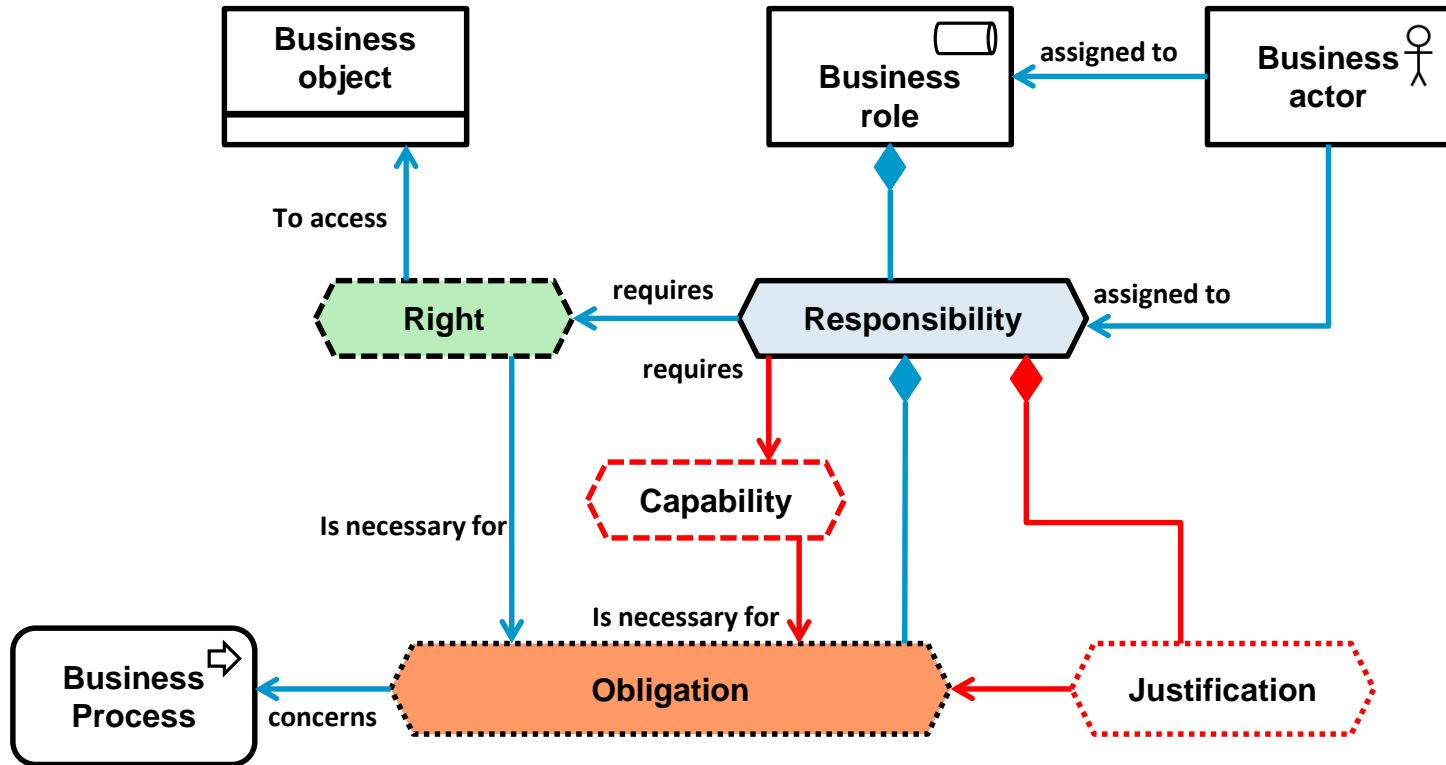
New Concepts

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

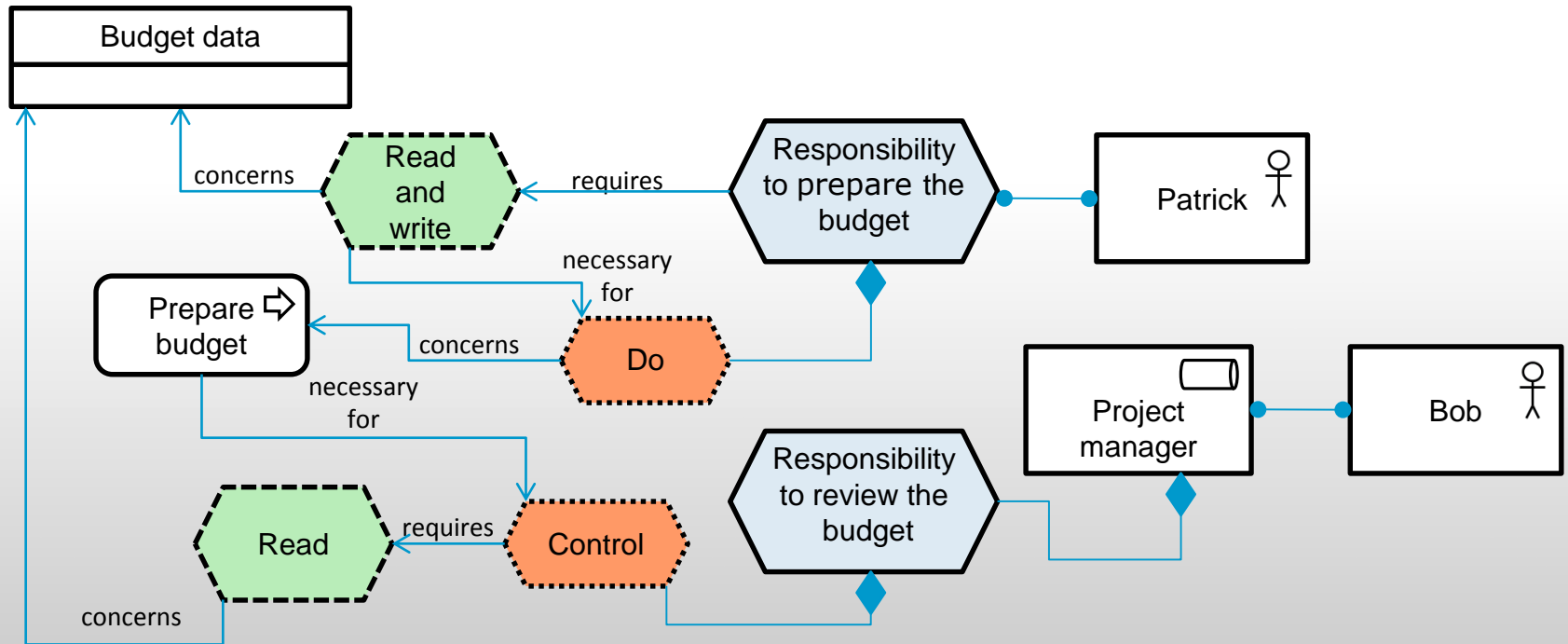
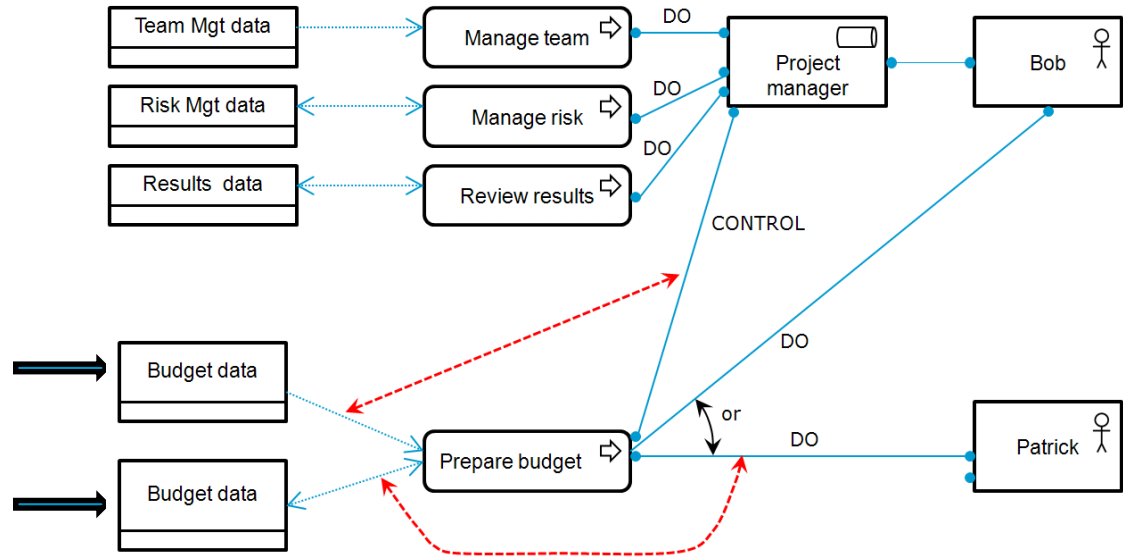
Responsibility Modeling



Responsibility Modeling



Responsibilities to perform and control the budget



Outline

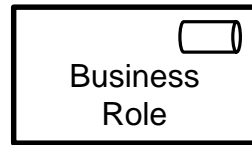
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Second research question

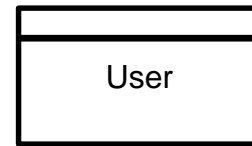
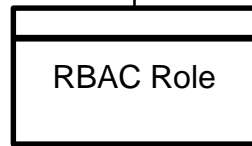
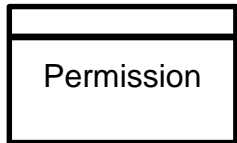
- How to include the responsibility with RBAC and with RBAC administration framework ?
 - Introduction of the responsibility at the business layer and at the application layer
 - Association of the responsibility with the Business role and the RBAC role.
 - Illustration with the case study

Administrative Framework **without** Responsibility

Business Layer

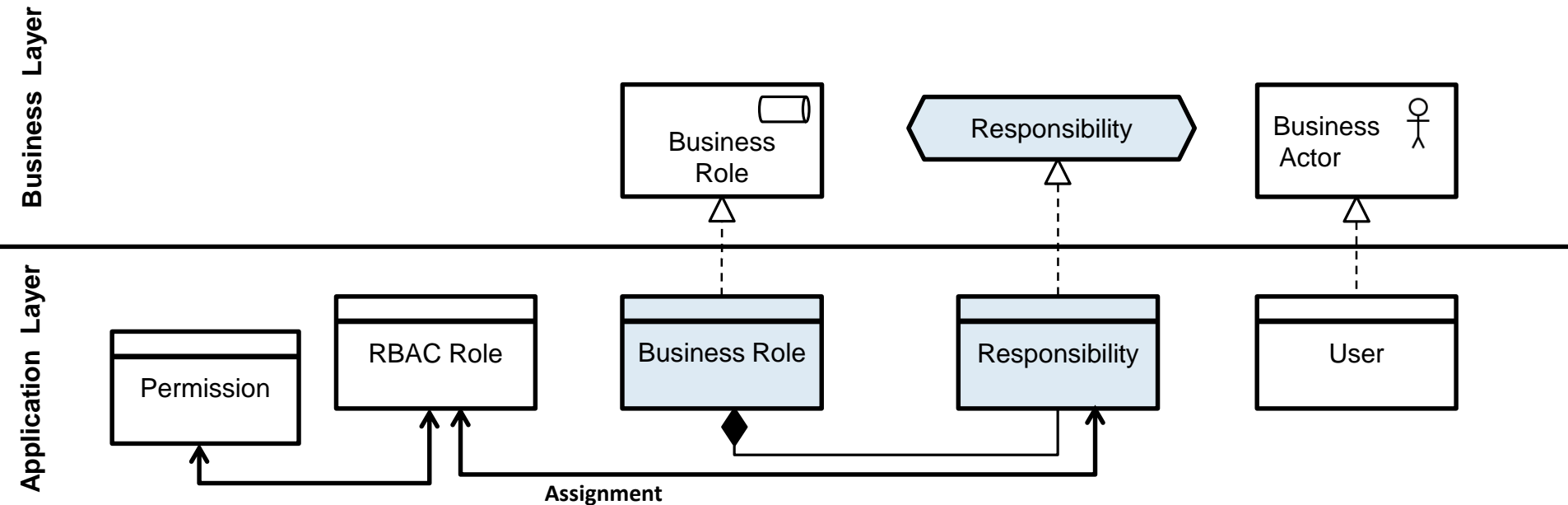


Inappropriate !

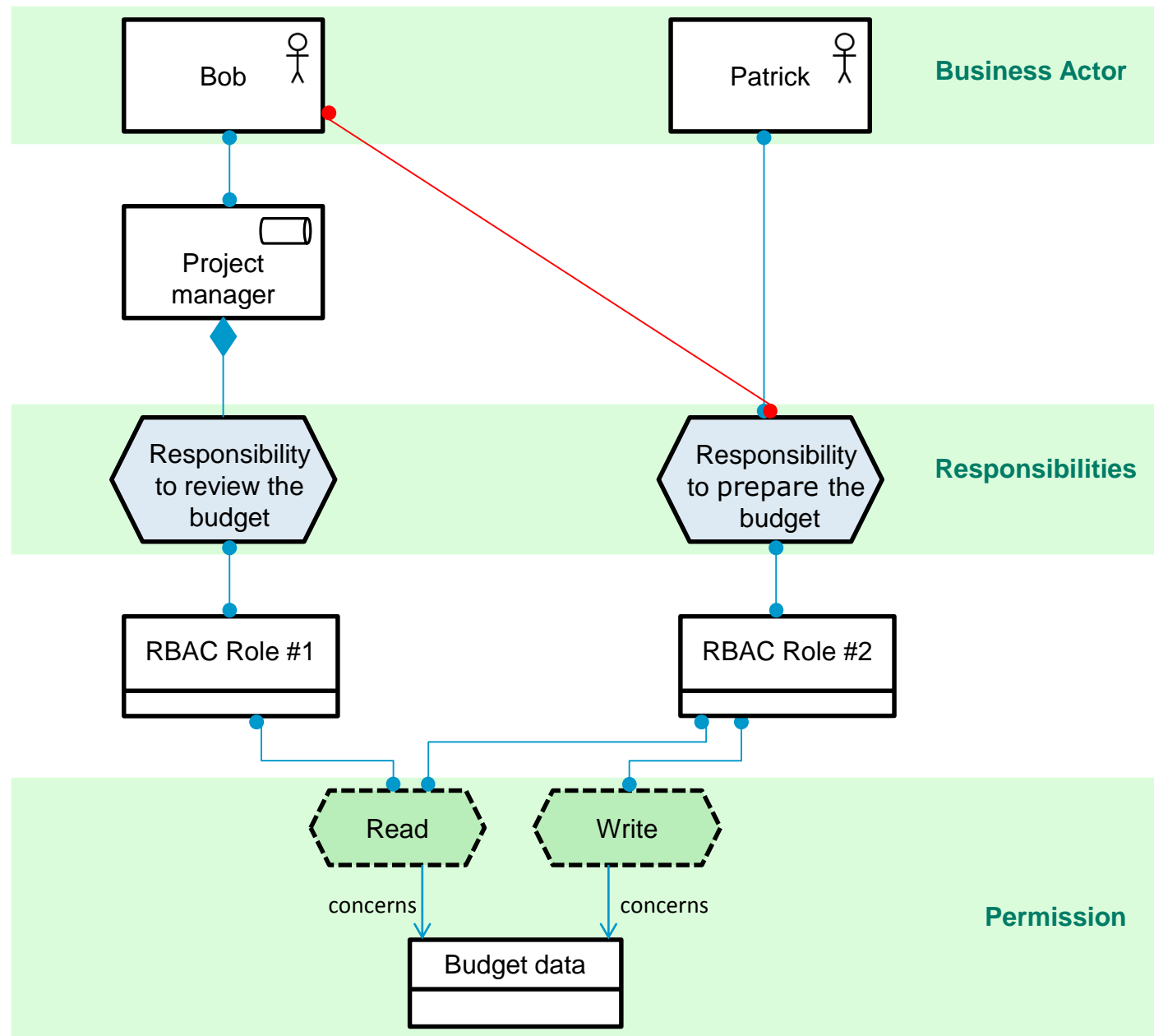


Application Layer

Administrative Framework **with** Responsibility

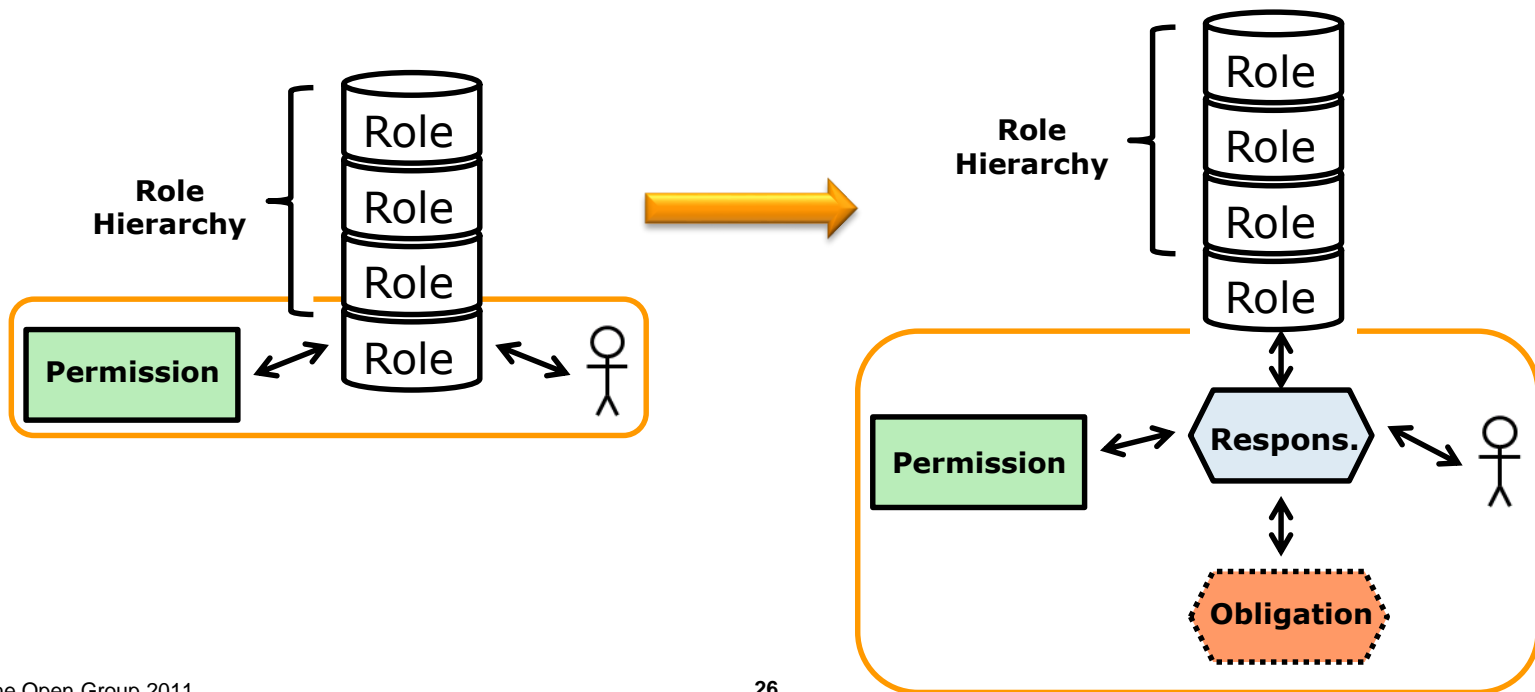


Case Study with Responsibility



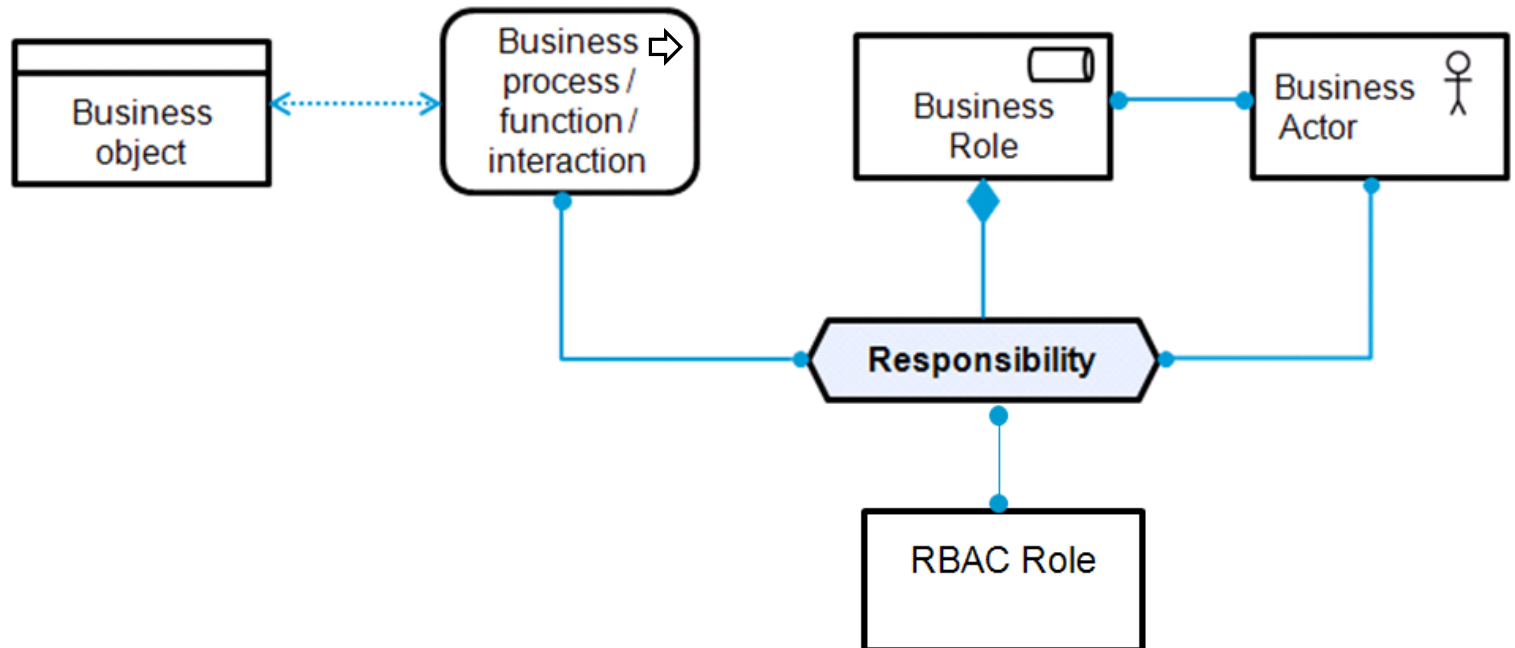
Conclusion

- 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 2010¹
 - 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 Standard² had not achieved compliance

Why Don't Stakeholders Act?

- Economic explanations fall into categories such as³
 - 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 Schneier⁴ 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 often⁴
 - 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 Schneier⁴ 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!

Supplementary Material

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