Model Labs

System Integration & Consulting

Modeling in Practice: The Good, The Bad and The Ugly

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FRESH THINKING

PLUG & PLAY YOUR BUSINESS

About the speaker

Model Labs
System Integration & Consulting

- 1995-2002 School of Electrical Enginnering, University of Belgrade
- 2002-2003 Diosphere Ltd., software engineer
- 2003-2005 Humboldt University of Berlin, PhD student
- 2006 Hasso Plattner Institute/ SAP Research, postdoc
- 2007-2009 Berlin University of Technology, senior researcher
- 2010 Habilitation, Berlin University of Technology
- 2010 Model Labs, co-founder and CEO

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Research/professional interest

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- System integration
- Model-driven software engineering
- Service oriented architecture
- Dependable and fault-tolerant systems

Summary

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- Vision: **Plug & Play your Business** – point and click system integration on demand
- Mission: development and sales of a software product family for automated system integration
- Target: report our experiences and lessons learned about model-based system integration in practice

Before we start...

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- *The Good, The Bad and The Ugly* (orig. *Il buono, il brutto, il cattivo*), is a 1966 spaghetti Western classic, directed by Sergio Leone

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Agenda

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- Introduction
- Technology
- Lessons learned:
  - The Good
  - The Bad
  - The Ugly
- Conclusion

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The mother of all integration problems...

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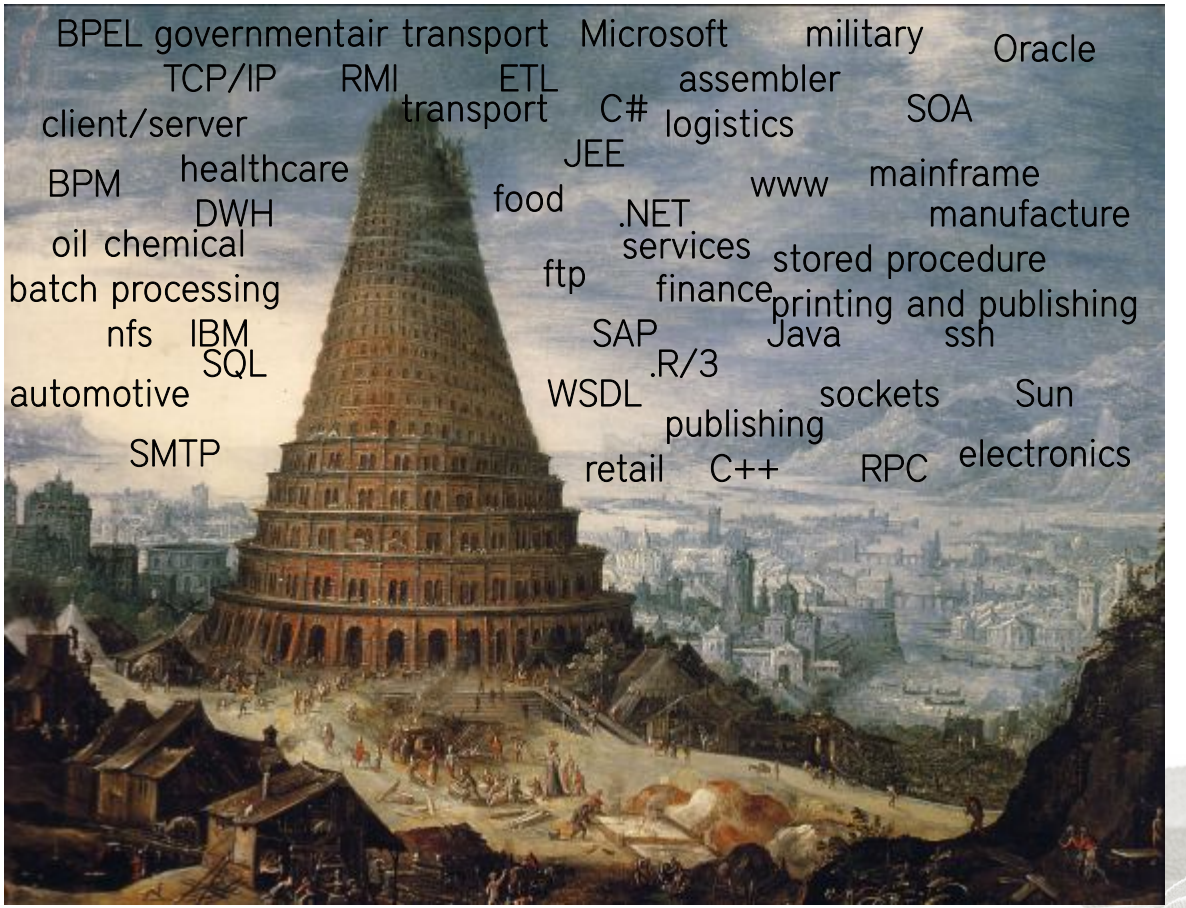

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...and some of its children

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- February 2008: crash of the baggage sorting of a major airport due to integration error with newly installed check-in software
- December 2007: crash of nationwide ERP system for national public school paycheck management due to integration error with teacher database
- June 2007: rail care fire in a major underground metro system due to integration error with sensor system
- May 2006: healthcare software vendor pays multimillion dollar settlement due to integration error
- May 2005: major hybrid car supplier installs a patch for more than 20 000 vehicles due to integration problems between the on-board computer and light and engine ignition control systems
- April 2004: Northeast USA blackout due to integration error between power monitoring and management system
- March 2002: an EU country faces more than 1 000 000 erroneous tax overcharged due to difficult integration test of multiple systems involved in calculation
- October 1999: Mars Polar Orbiter crashes due to integration error between navigation and engine control systems
- ...and many, many, many more (think Ariane V)

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Problem: complexity

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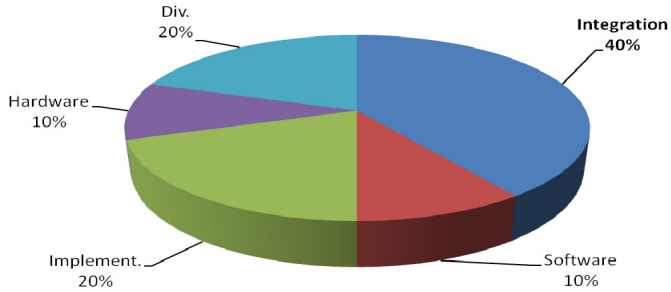
- Integration of heterogeneous IT systems
  - More than 40% of IT budget
  - Integration requirements grow exponentially:

Number of software systems	2	3	10	100	250	350
Maximum number of connections	1	3	45	4.950	31.125	61.075

  - Complexity
  - Change Management
  - Evolution
  - Isolation
  - Price
  - Dependency (vendor lock-in)
  - How to understand integration business process?
  - How to document integration projects?



Source: Forrester Research

Solution: abstraction

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„Problems cannot be solved by the same level of thinking that created them“ – A. Einstein

- Abstraction through modeling
- Automated system integration
  - Automated recognition of integration incompatibilities
  - Automated generation of software connectors
  - Active and early involvement of business and domain experts
  - Technical/business documentation in machine readable form
- Benefits
  - High reliability and efficiency (time, money, personnel)
  - Reuse
  - Evolution: support for enhancements

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Our benefits in numbers

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- Model Labs products enable our customers
  - Threefold productivity improvement
  - Halved number of errors
  - 80% of source code automatically generated

- Success Stories:
  - Integration of complex clinical pathways in the healthcare sector
  - Integration of facility management, patient management and ERP systems in the welfare sector
  - Integration of Webshop, ERP, CMS and content delivery systems in the publishing and media sector

Background: BIZYCLE

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- BMBF[1] Research project (www.bizycle.com)
  - From 2007 to2009
  - 6,5 Mio. Euro Budget
  - Consortium: 6 industrial partners and TU Berlin
- Results:
  - Operational prototype
  - Pilot projects (Healthcare, publishing and media sectors)
  - More than 10 research publications
- Model Labs GmbH converts the prototype into the market ready product: Model Labs Integration Suite

BIZYCLE

[1] Federal Ministry of Education and Research

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Model Labs products

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Bm Business Process Modeler

- Integration specific business processes
- Domain vocabularies

Sa Service Adapter Developer

- Automated interface modeling
- Interface wrapping (Web Services)

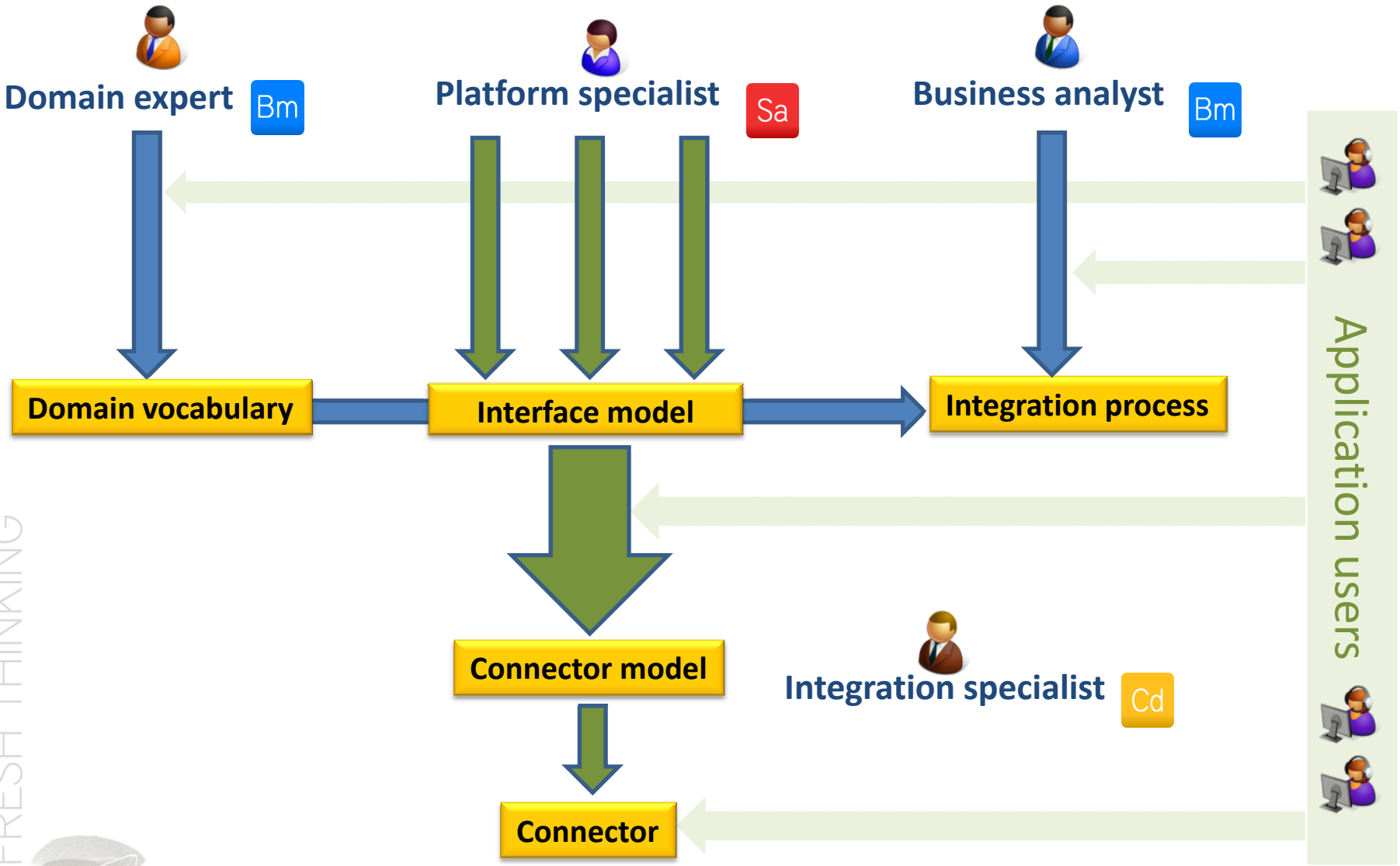
Cd Connector Developer

- Modeling software connectors
- BPEL code generation

Is Integration Suite

- Includes Bm, Sa and Cd
- Automated integration conflict analysis
- Runtime environment (ESB), model repository

Model Labs integration method and stakeholders



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Abstraction levels

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- Multilevel modeling with (semi)automated transformations/code generation:
  - Business process model
  - Integration process model
  - Semantic (domain ontology, vocabulary) model
  - Interface model
  - Platform independent interface model
  - Connector model
  - Connector code

Reference: Facility Management-Integration @ EJS Berlin

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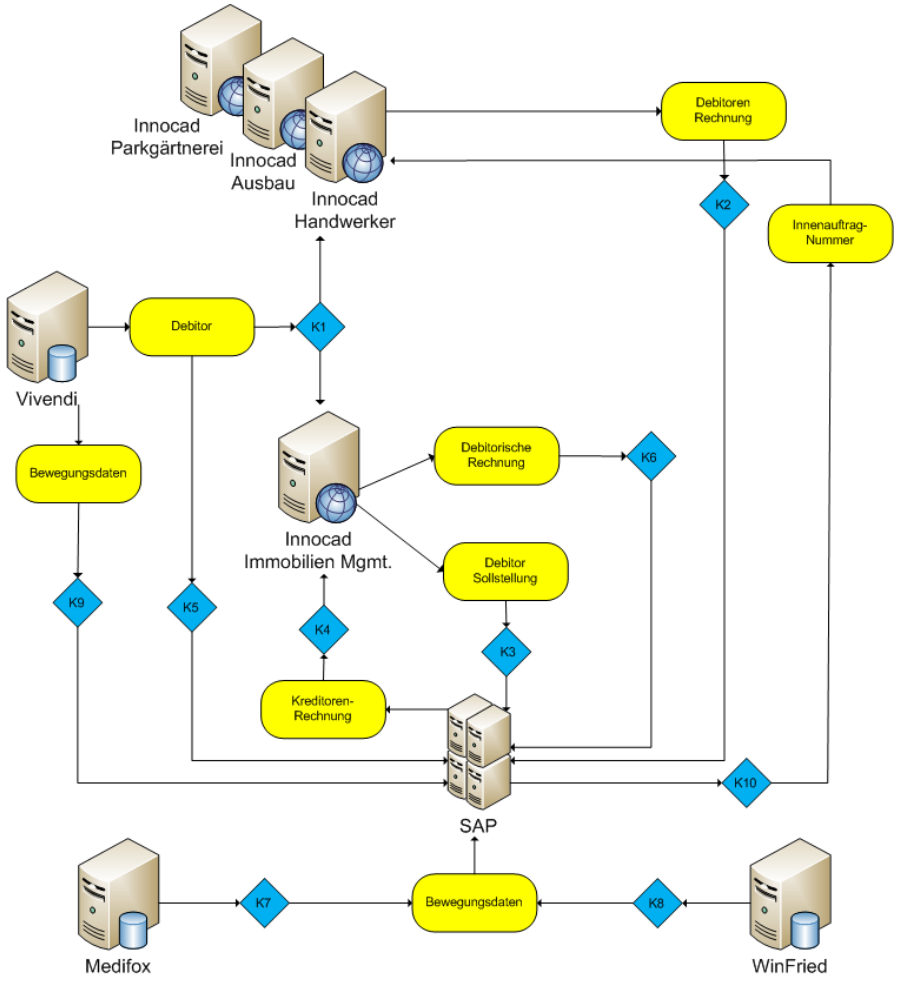

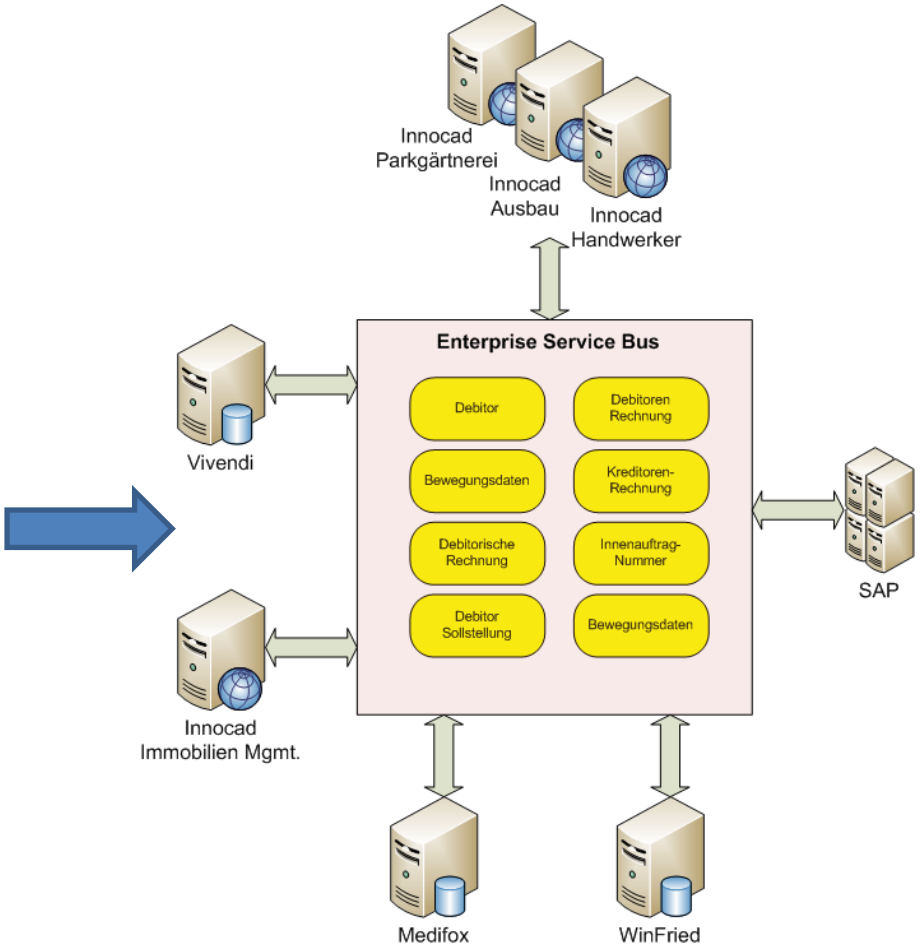

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Evangelisches Johannesstift

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The Good

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- End customers can (even like to) model!
- Cooperative work
  - Numerous stakeholders
  - Business vocabulary (business objects, units, functions)
  - Smoother communication
  - Acceptable learning curve
- Quality and Performance
  - Automation of routine tasks
  - Better, faster, cheaper
  - Experimenting and simulating
  - Scalability
- Rapid reaction to change requests
  - Interface modifications, data modifications
- Flexibility: platform independence through code generation
  - No vendor lock-in, easy migration, no additional investment
- Reuse
  - Interface descriptions, ontologies, processes

The Bad

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- End customers can (even like to) model!
  - But not using UML: need for Domain Specific Languages and tools
- Cooperative work
  - But it requires repository support
  - Synchronization, versioning, merging, consistency
  - ROI not always obvious or immediate
- Quality and Performance
  - But on the right abstraction level: sometimes better to code than to model
  - Java/C# should not be considered harmful
  - Java/C# level should not be artificially repeated at the model level
  - Generated business logic is often slow and incorrect
- Rapid reaction to change requests
  - But no silver bullet or magic wand
- Flexibility
  - But comes at the price of code-generator development

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The Ugly

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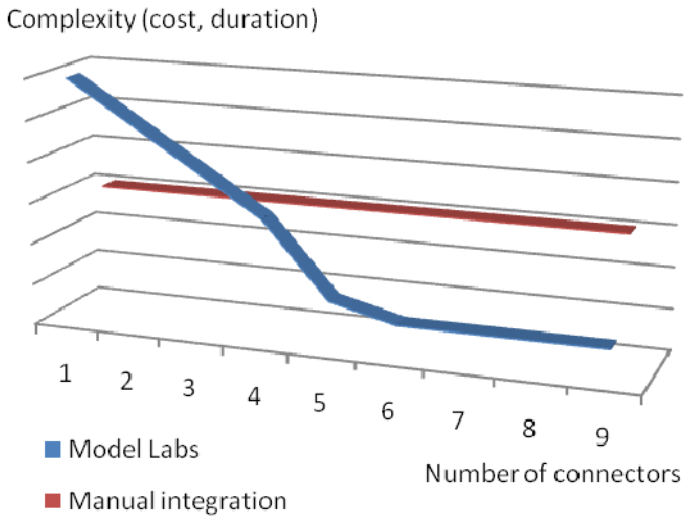
- Data quality
  - Solution works perfect at the model level, breaks completely in runtime
  - Numerous problems at the data level (missing, incorrect, mismatched, unaligned data etc.)
  - Instance-level modeling is required (e.g., pre- and post-conditions)
- CTO/CFO
  - Looks (almost) only until the end of the current quarter
  - Difficult to communicate added value/ROI
  - Expects a miracle
  - "You can' t get fired by buying from IBM"



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But the winner is...

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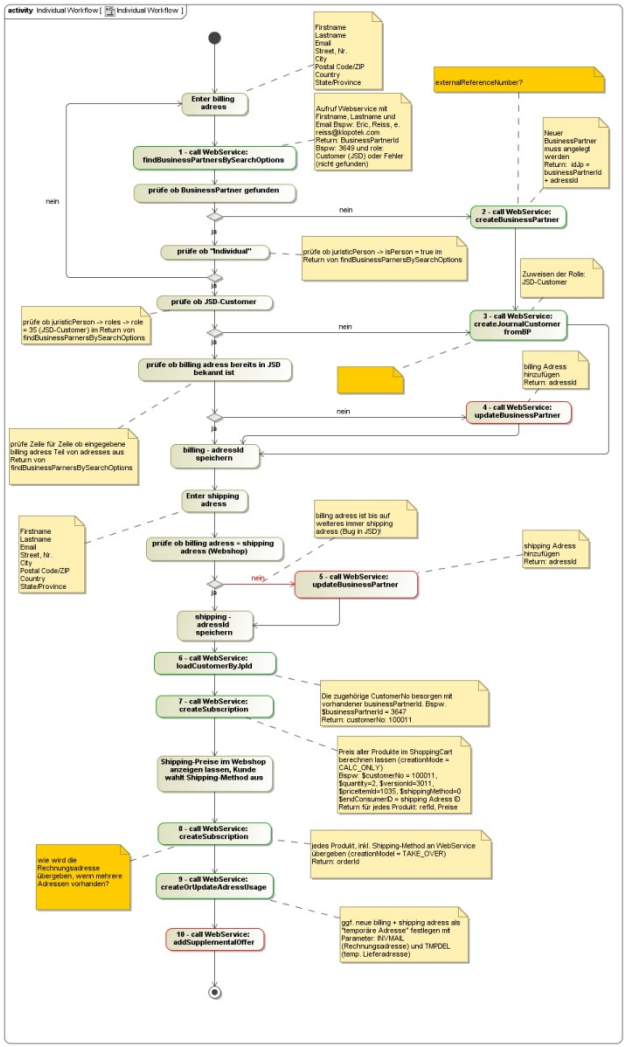
- Interface granularity
  - Exposing technical instead of business function
  - “Our system has an integration layer”
- Results in trying to model and generate **this** on the connector side for the “simple” register user function:



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It' s not (only) about money

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- Non-integrated systems kill[1]:
  - More than 100 000 people die from medical errors each year in the USA only
  - More than 85% of errors are caused by missing or wrong data
  - Nevertheless, system integration today is currently too expensive to be systematically applied in the healthcare sector
  - These deaths amount to two B-737 crashing each day and killing all aboard!

  - Advanced integration technologies can make a difference and save these lives!

[1]Lori A. Clarke & Leon J. Osterweil, University of Massachusetts, Amherst,
Laboratory for Advanced Software Engineering Research, Electronic Enterprise Institute

It is possible to start up a company from the university

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- (Some) references in year one

klopotek.

- (Most) important things:
  - Team!!!
  - Innovation!
  - Business plan
  - Sales channels
  - Partner network

  - "Love your cash flow more than your mother"

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Cooperation with Model Labs

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- Master topics:
  - Definition and composability of domain specific languages (DSL)
  - Frameworks and tools for composable DSL-based code generation
- PhD topics:
  - DSL-based software factory (automated and composable generation of complex software applications)
  - Automated generation of service availability, performance, and performability models

...and of course visit Berlin

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