Key success factors in advanced analytics:
Learnings from analytical projects in health insurance.

Dr. Bernhard Brabec, Head of Customer Analytics, 20.04.2017

Bildstrecken

Die Prämien steigen 2017 um 4,5 Prozent

Bundesrat Alain Berset erklärte den Aufschlag der Krankenkassenprämien im nächsten Jahr. Eltern erwartet ein happiger Aufschlag.

Überbringer der jährlichen Hiobsbotschaft: Gesundheitsminister Alain Berset im Medienzentrum des Bundes in Bern. (25. September 2016) Bild: Anthony Anex/Keystone

26.09.2016

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Feedback

Die Krankenkassenprämien für Erwachsene steigen im nächsten Jahr um durchschnittlich 4,5 Prozent. Am grössten ist der Anstieg mit 6,6 Prozent bei den Kinderprämien. Grund dafür sei, dass die Prämien bei den Kindern in den letzten Jahren die Kosten nicht mehr zu decken vermochten, schreibt das Bundesamt für Gesundheit (BAG) in einer Mitteilung von heute.

Zwar müssen die Krankenkassen für Kinder tiefere Prämien festsetzen als für Erwachsene. Die Höhe des Rabatts ist aber nicht vorgeschrieben. Vor den Medien erklärte Bundesrat

Stichworte

Krankenkassen/Prämien

Artikel zum Thema

Krankenkassenprämien sollen um bis zu 10 Prozent steigen

Jede fünfte Versicherungsprämie soll 2017 massiv teurer werden. Das zeigt eine

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Krankenkassen

Prämien steigen im Schnitt um 4,5 Prozent

26.9.2016, 09:45 Uhr

Alle Jahre wieder steigen die Krankenkassenprämien. Im kommenden Jahr betragen die Aufschläge bei der Standardprämie je nach Kanton zwischen 3,5 und 7,3 Prozent.

f 🐦 ✕ in ✉ 🖨 5 KOMMENTARE

Bundesrat Berset überbringt zusammen mit BAG-Direktor Strupler die jährliche schlechte Kunde zu den Krankenkassenprämien. (Bild: Keystone)

(sda)/fsr./tri. Das hohe Niveau der Gesundheitsversorgung habe seinen

MEISTGELESEN

Avenir Suisse für eine neue Handelsstrategie
Die Bilateralen und mehr
Simon Gemperli / vor 3 Stunden

Atomausstiegsinitiative
AKW sollen bis 2029 vom Netz gehen
vor 2 Stunden

Abtretender Staatssekretär
Rossiers diplomatischer Fallschirm
Jan Flückiger, Bern / 5.10.2016

FINDE DEINE IMMOBILI

Dr. Bernhard Brabec

Head of Customer Analytics

Head of Predictive Analytics

Senior Manager Consulting

Manager Avalanche warning systems

PhD in computer science

Postdiploma course statistics

MSc in Computer Science

Content

Introduction & Context
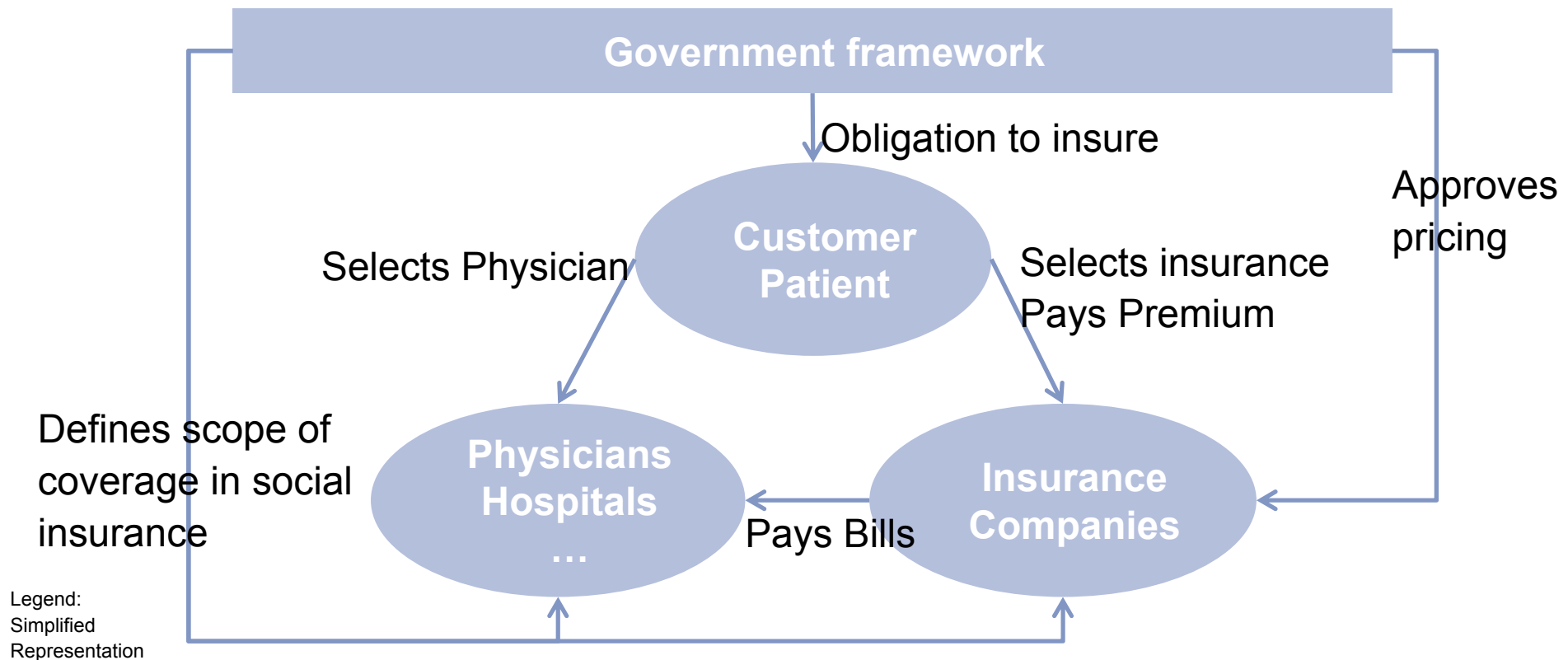>   The Swiss Health Care System
>   Helsana Key Figures
>   Motivation

Applying Advanced Analytics to churn prediction

Summarizing Key Learnings

The Swiss Health Care System is run by private companies under a government framework

Government framework

Obligation to insure

Approves pricing

Selects Physician

Customer Patient

Selects insurance Pays Premium

Defines scope of coverage in social insurance

Physicians Hospitals ...

Pays Bills

Insurance Companies

Legend:
Simplified
Representation

>100 years

Helsana has more than 100 years' **experience** in the health and accident insurance business.

6 bn CHF

Premium income
70% social insurance
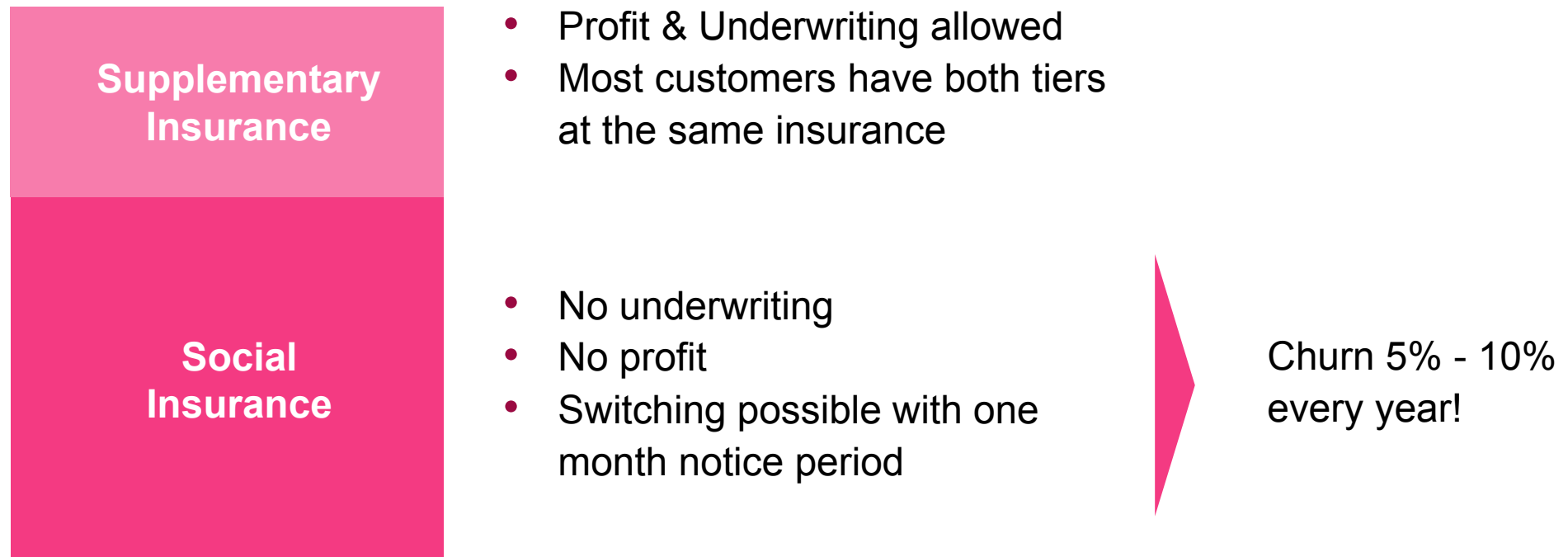30% supplementary insurance

100 m CHF

Per week
Helsana **pays out** around CHF 100 million.

1,9

Helsana embraces its **social responsibility** and insures 1.9 million people – or one in four people in Switzerland.

Swiss healthcare regulations enable high churn, which needs to be addressed

Two Tier Health Insurance

Supplementary Insurance
Social Insurance

- Profit & Underwriting allowed
- Most customers have both tiers at the same insurance

- No underwriting
- No profit
- Switching possible with one month notice period

Churn 5% - 10% every year!

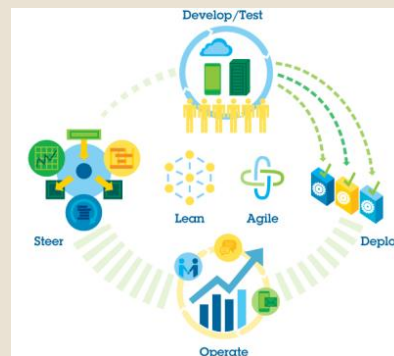# Our motivation for using advanced analytics in reaching challenging business goals

Requirements:

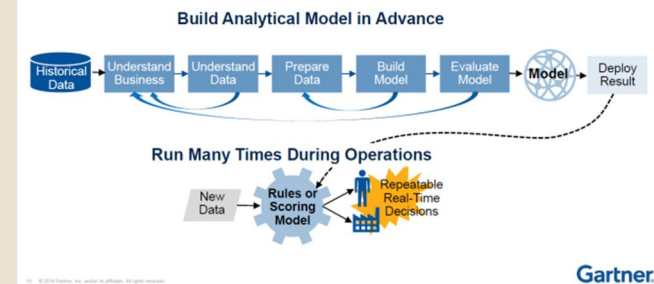| Reduction of **Time-to-Market** when deploying new analytic models! | Transition from agile development to stable operation! | Use of analytical insights in operational processes for real-time decisions! |

Source: shiratech
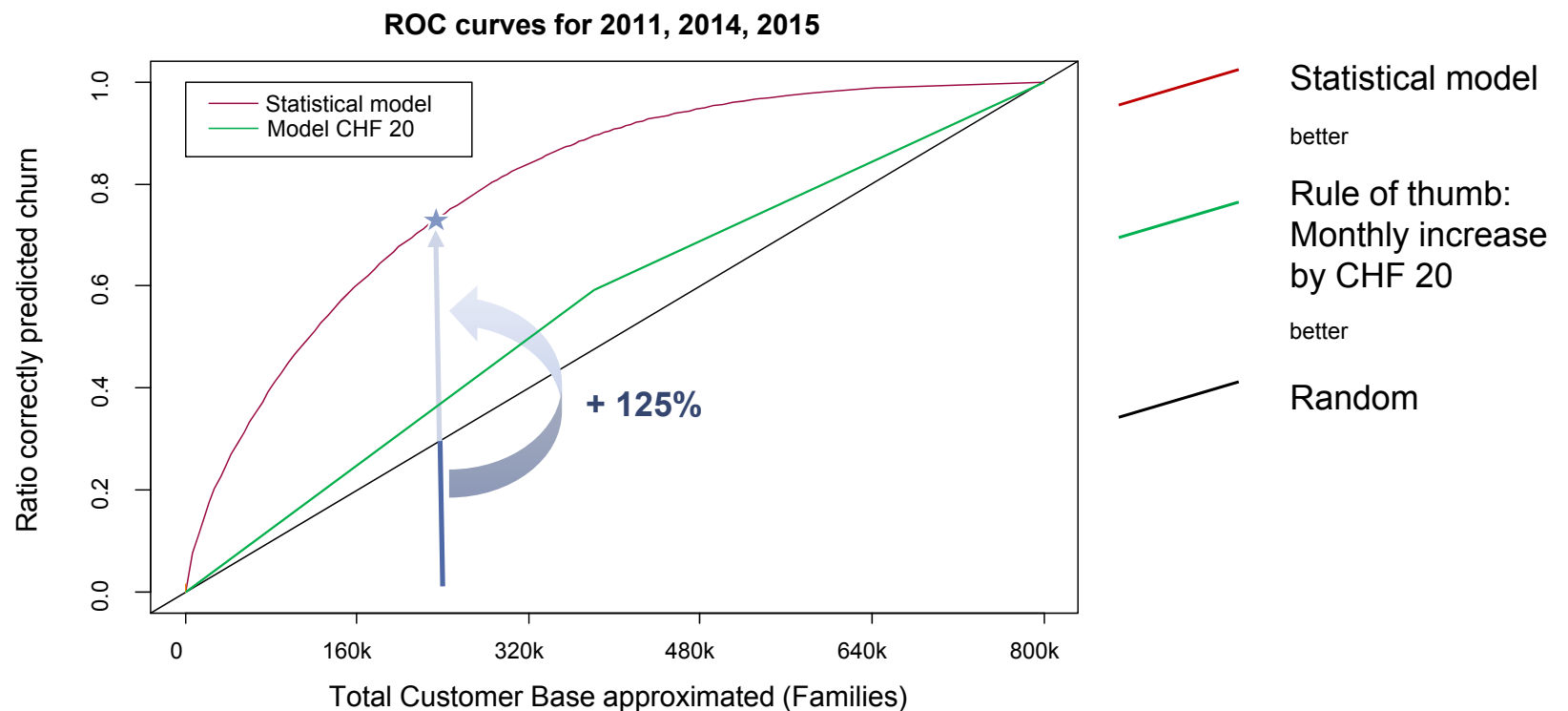

Source: IBM

Reusable Models Are Essential to Making Decisions in Real Time

Build Analytical Model in Advance

Run Many Times During Operations

Gartner

Source: Gartner BI & Analytics Summit 2016

Our model allowed to reach 125% more customers at risk of churn than a random selection

ROC curves for 2011, 2014, 2015

Statistical model

better

Rule of thumb:
Monthly increase
by CHF 20

better

Random

Many factors influence churn
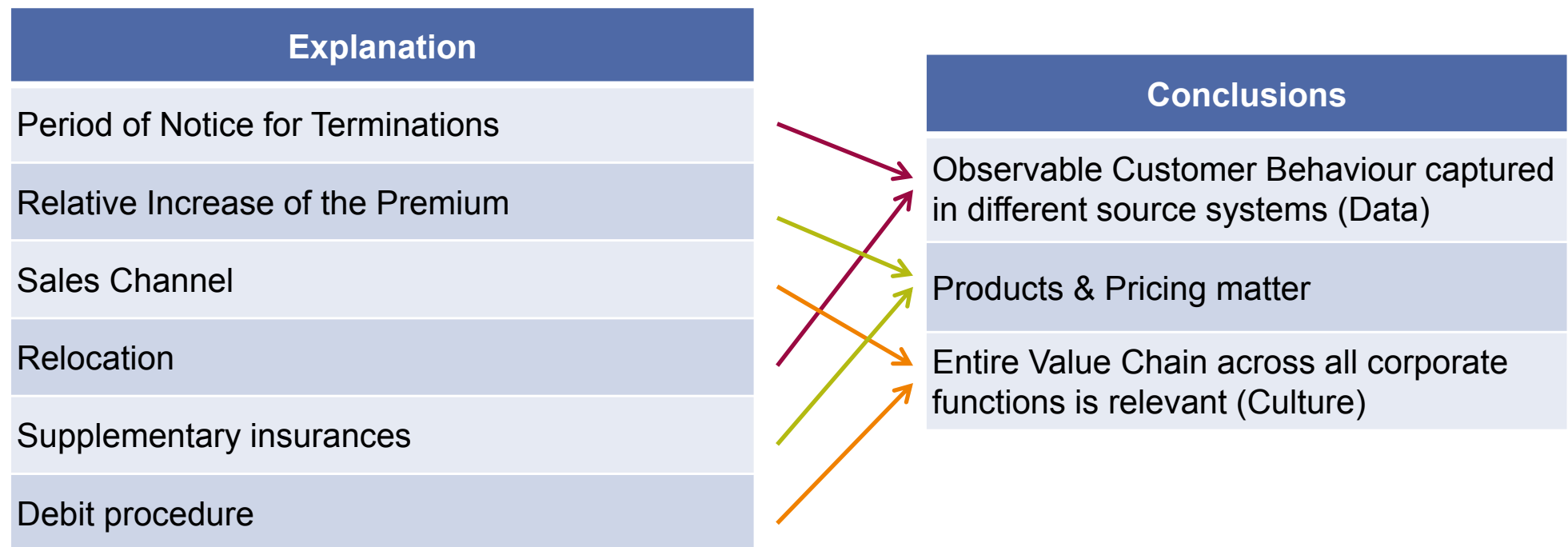
Approach

- Target event:
  Family terminates contract

- Data from various sources

- Multiple data preparation steps.
  In total, we evaluated 50 variables

- Model: Logistic Regression

Results

15 relevant variables were used in 2015. We call them influencing factors now. Six of them are:

Influencing Factor	t-value	Explanation
VisionWF_Kuendigung_frist_Anfrage_fg	41.2	Customer asks the Period of Notice for Terminations
Diff_vj_aj_rel 10%	19.4	Relative Increase of the Premium of the Social Insurance
prod_stat_bez_x_1	9.9	Sales Channel that attracted customer originally
Max_umzug_uj_fg	9.3	Relocation current year
vvg_spital_x	9.0	Combination of supplementary insurances
LSV	6.1	Chosen automatic debit procedure

Factors influencing Churn: customer behaviour, product & pricing, entire value chain

Explanation
Period of Notice for Terminations
Relative Increase of the Premium
Sales Channel
Relocation
Supplementary insurances
Debit procedure

| Conclusions |
|---|
| Observable Customer Behaviour captured in different source systems (Data) |
| Products & Pricing matter |
| Entire Value Chain across all corporate functions is relevant (Culture) |

We compared Deep Learning with typical data mining algorithms in a well known, controlled setup

Approach

- Same churn situation as before

- Real data from 2014 with 50 variables

- Sampling ~60'000 families with the same number of churners (30k) and non-churners (30k)

- We compare different machine learning methods with DNN

Deep Neural Networks (DNN) have more than 1 hidden layer.
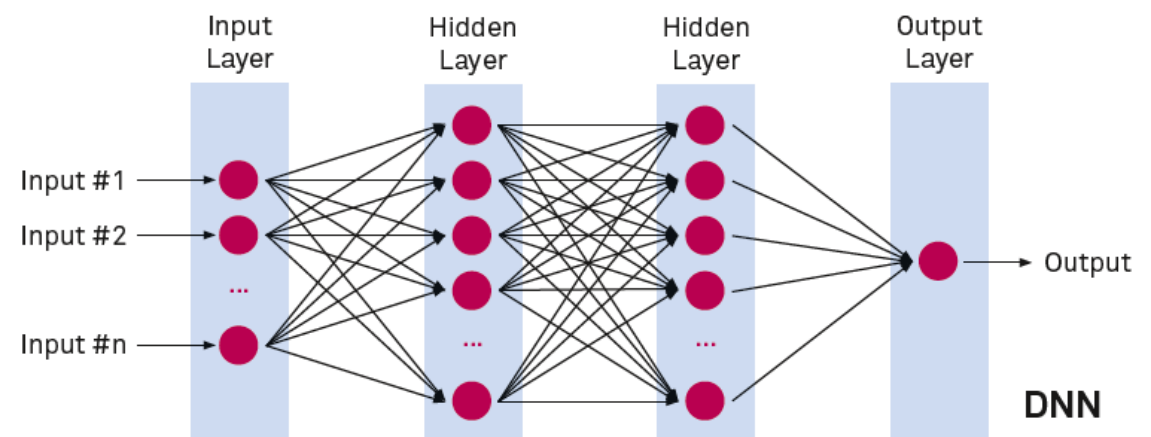
Deep Neural Networks deliver comparable results, but do not outperform

Helsana

BUSINESS INTELLIGENCE
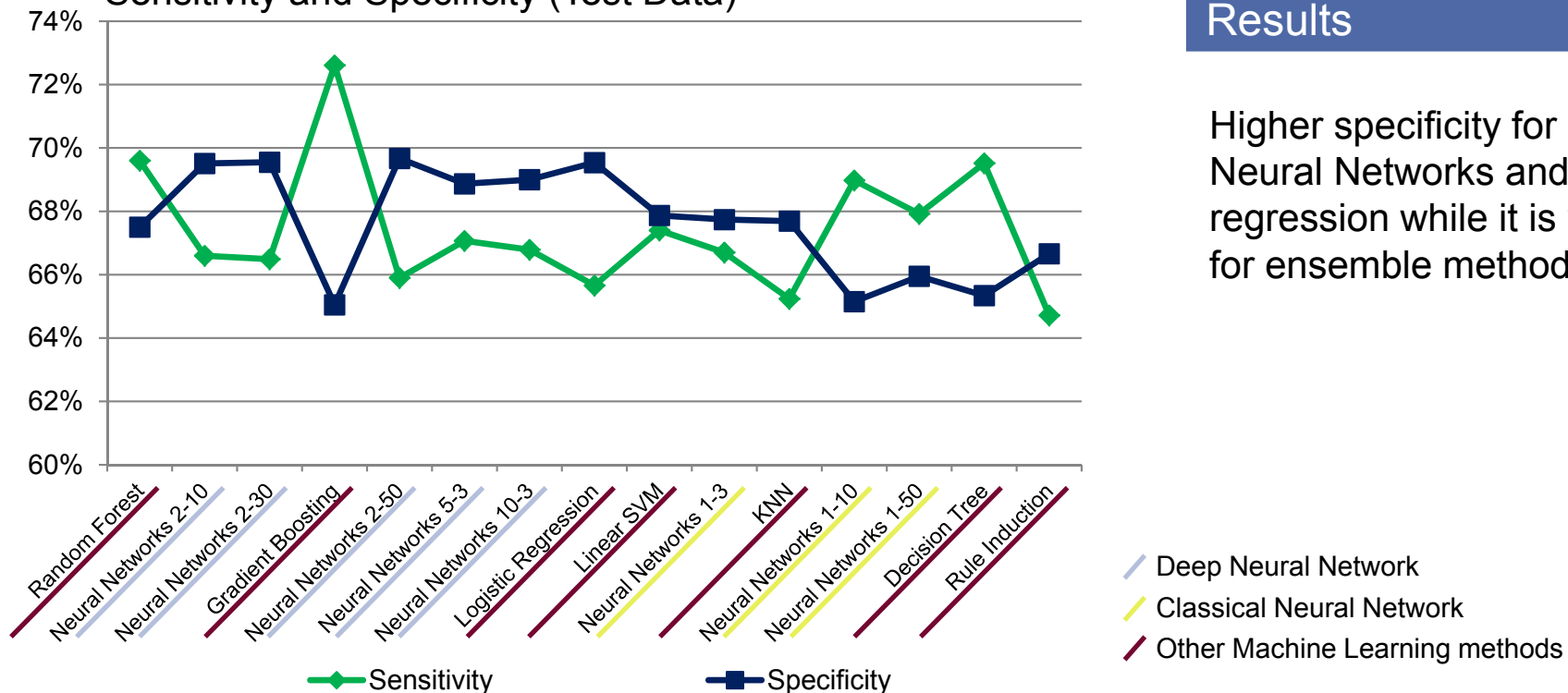
ROC Index (Test Data)
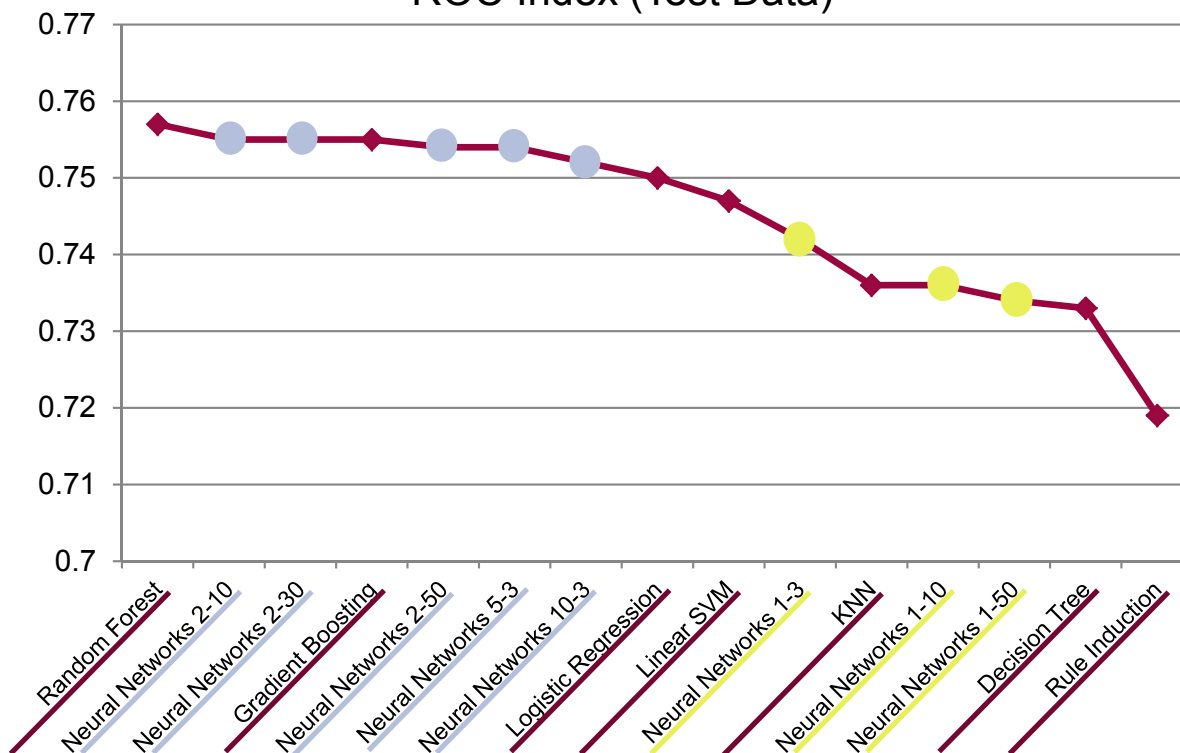
	Results

For the chosen setup, Deep Neural Networks perform as good as best performing classical methods, but not better.

- ● Deep Neural Network
- ● Classical Neural Network
- ◆ Other Machine Learning methods

No method outperforms in sensitivity and specificity at the same time

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Sensitivity and Specificity (Test Data)

Results

Higher specificity for Deep Neural Networks and logistic regression while it is vice versa for ensemble methods.

Legend:
- Deep Neural Network
- Classical Neural Network
- Other Machine Learning methods

◆ Sensitivity   ■ Specificity

X-axis categories: Random Forest, Neural Networks 2-10, Neural Networks 2-30, Gradient Boosting, Neural Networks 2-50, Neural Networks 5-3, Neural Networks 10-3, Logistic Regression, Linear SVM, Neural Networks 1-3, KNN, Neural Networks 1-10, Neural Networks 1-50, Decision Tree, Rule Induction

Available data is key for deep learning algorithm as well

Results	Conclusions
DNN do not outperform	New algorithms alone don't help much.
Higher specificity, lower sensitivity, and vice versa.	Available data is crucial. (Data)
Winning algorithm depends on business question that you intend to optimize	Key people need to understand the business question and have the analytical skills. (People)
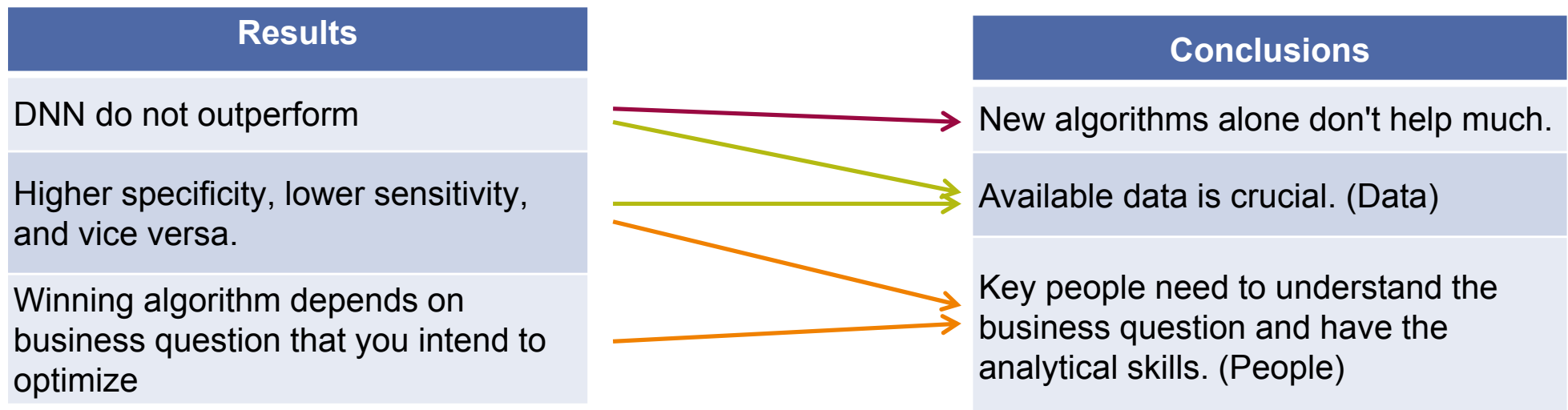
Key success factors to apply advanced analytics are <u>data</u>, <u>people</u> and <u>culture</u>

Data

➢ Use the data, all data, from all projects, across all business functions, all customer interactions as far as allowed by data protection laws

➢ New data may require new algorithms like deep learning, new algorithms alone don't help much

People

➢ Build strong teams with business knowledge, analytical skills and data expertise

Culture

➢ Build trust in analytical insights and implement it in operational processes

Thank you for the attention!
Questions?

Contact

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