Applying Analytics on Critical Processes

"Predicting patient inflow for emergency care"

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Atos Netherlands

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Atos Overview

5 IT service company in the world, # 1 in Europe

Revenue (EUR)	Employees (Global)	Countries
13bn	**110,000**	**73**

"Our vision for the future: to accelerate progress by uniting people, business and technology."

SIEMENS

Strategic Alliance
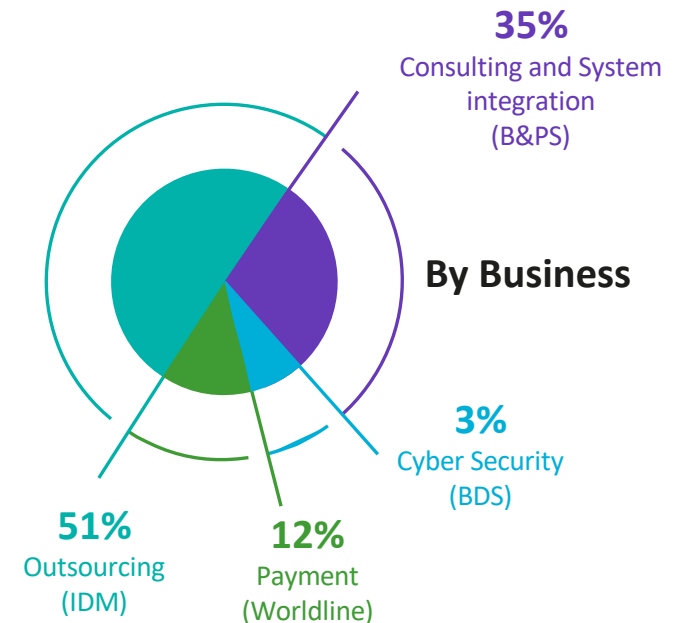R&D budget increase to €330m

PyeongChang 2018

Olympic IT Partner
Since 1996

Microsoft

Global Partnership
Global partnership in data analytics and cloud

Google Cloud

Strategic Global Partnership
Secure hybrid Cloud and data analytics.
Atos to create three R&D centers and Innovation Labs in Europe and North America to focus on AI & ML

Atos **acquired companies** over past 2 years:

- **Digital River**
- **Pursuit Healthcare Advisors** (vertical)
- **Conduent Breakaway Group** (vertical)
- **Siemens Convergence Creators**
- **zData** (analytics)
- **Equens**
- **InfoPartners** (vertical)
- **EngageESM**
- **Anthelio** (vertical & analytics)

By Business

- **35%** Consulting and System integration (B&PS)
- **3%** Cyber Security (BDS)
- **12%** Payment (Worldline)
- **51%** Outsourcing (IDM)

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Think global, act local

9,500
UK & Ireland

6,000
Iberia

14,500
France

12,500
North American Ops

3,000
South America

13,000
Benelux & The Nordics

9,500
Central & Eastern Europe

11,000
Germany

39,000
Asia Pacific

2,500
Middle East & Africa

Basel

Tier III+ DC

Zurich

Bern

500

Vevey

Nyon

■ Atos Switzerland
■ Data Center
■ Atos Consulting
■ Unify

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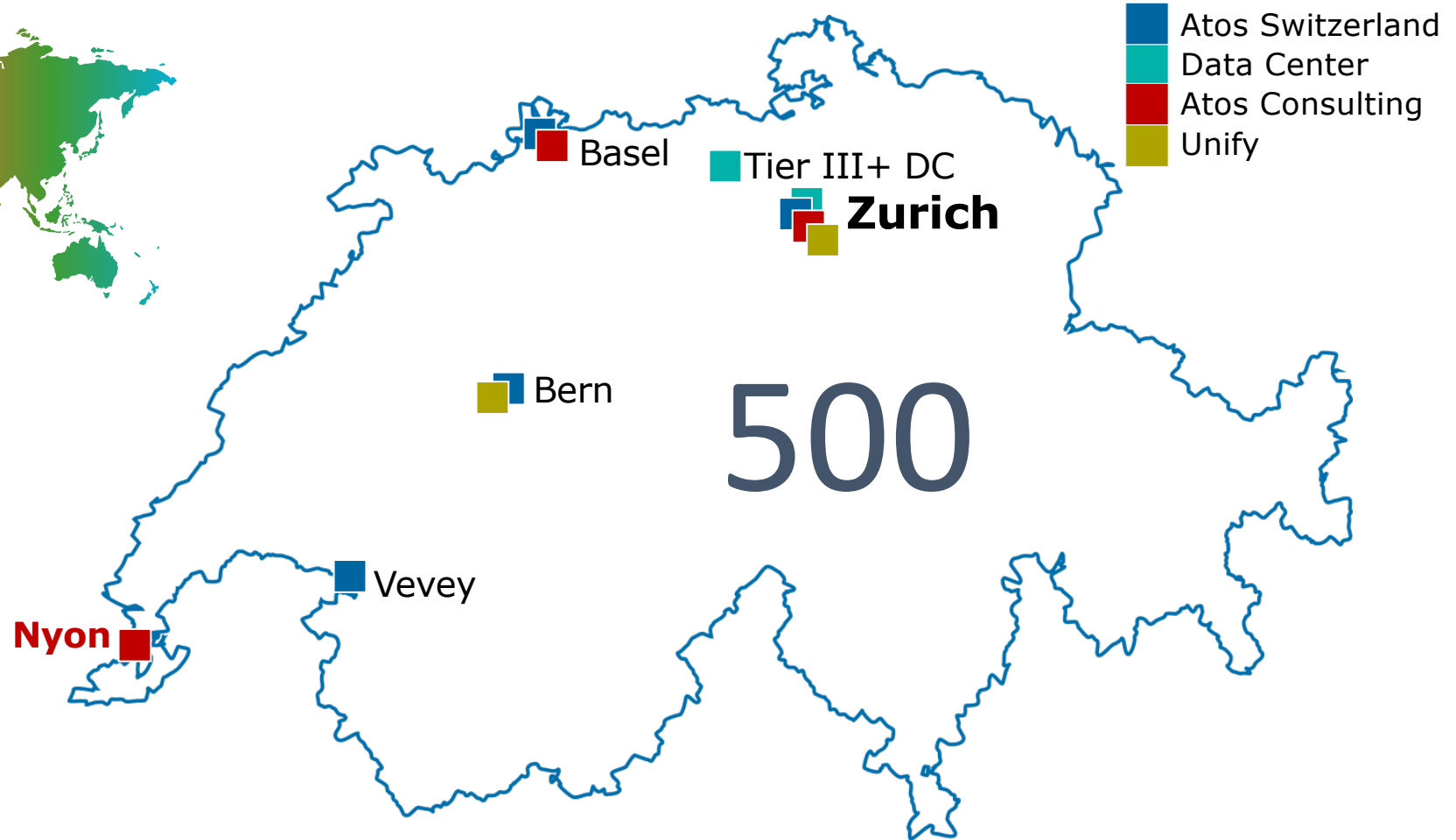
Introduction

- The emergency departments (ED) in hospitals are dedicated to people who need immediate medical care and can be visited on any day at any time
  - In the Netherlands over **1,000,000 people** visited EDs yearly since 2013 (source: LIS)
  - This number is rising due to population increase and population aging
  - Especially ambulance usage is increasing for critical care patients

- However budget cuts and a reduction in qualified personnel are leading to problems in providing consistent care and pose a future threat

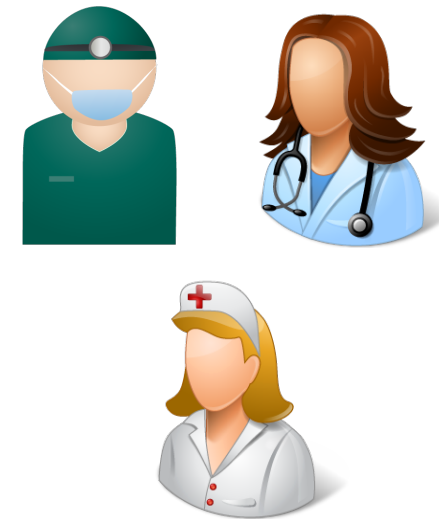- Data Analytics and Machine Learning could help remedy the situation

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Current Situation in a Single Hospital

Inflow Type

Can we use a data-driven approach to streamline parts this process?

Emergency Dept. Team

Walk-in
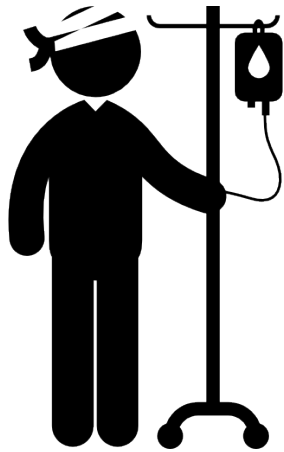
Doctor

Emergency Dept.

Ambulance
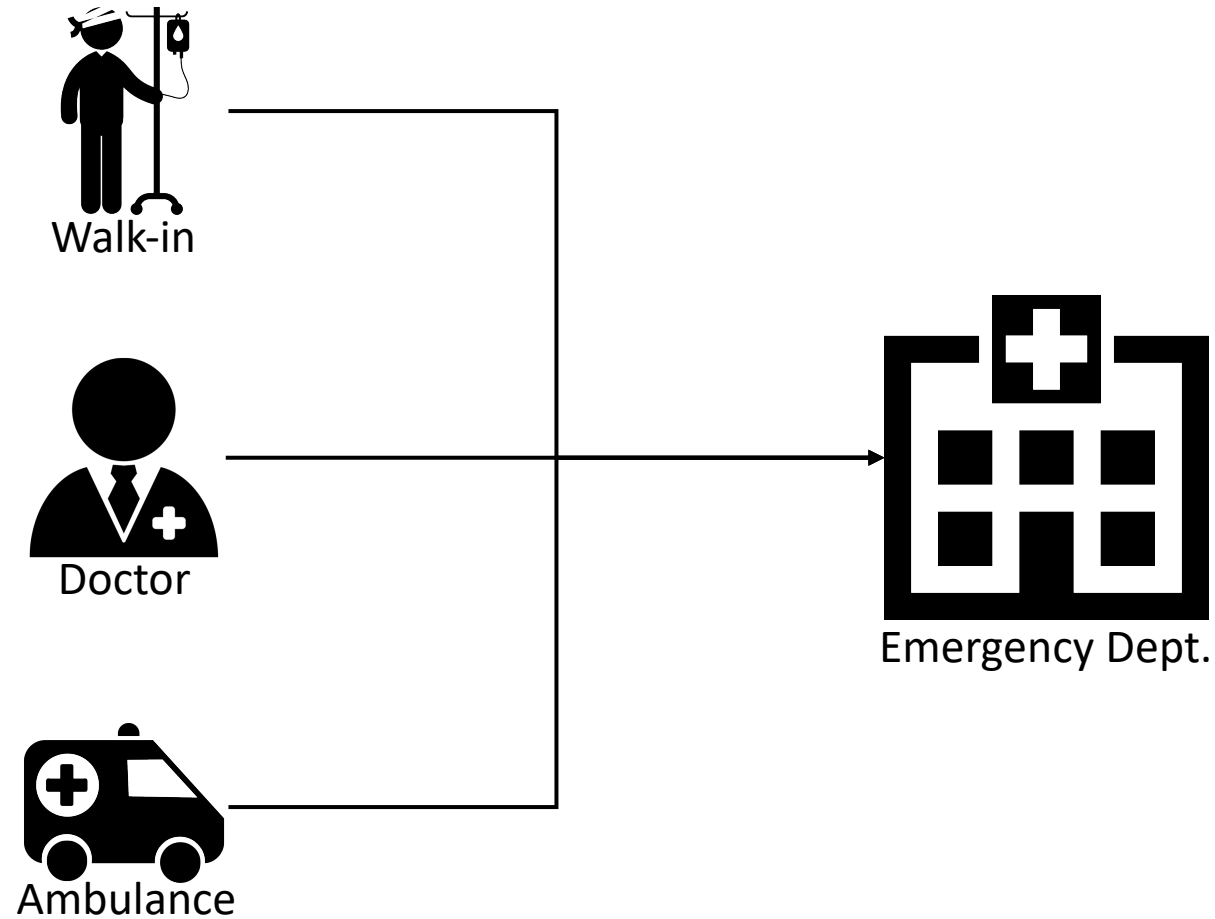
Nurses and doctors are evenly planned over the week in three daily shifts
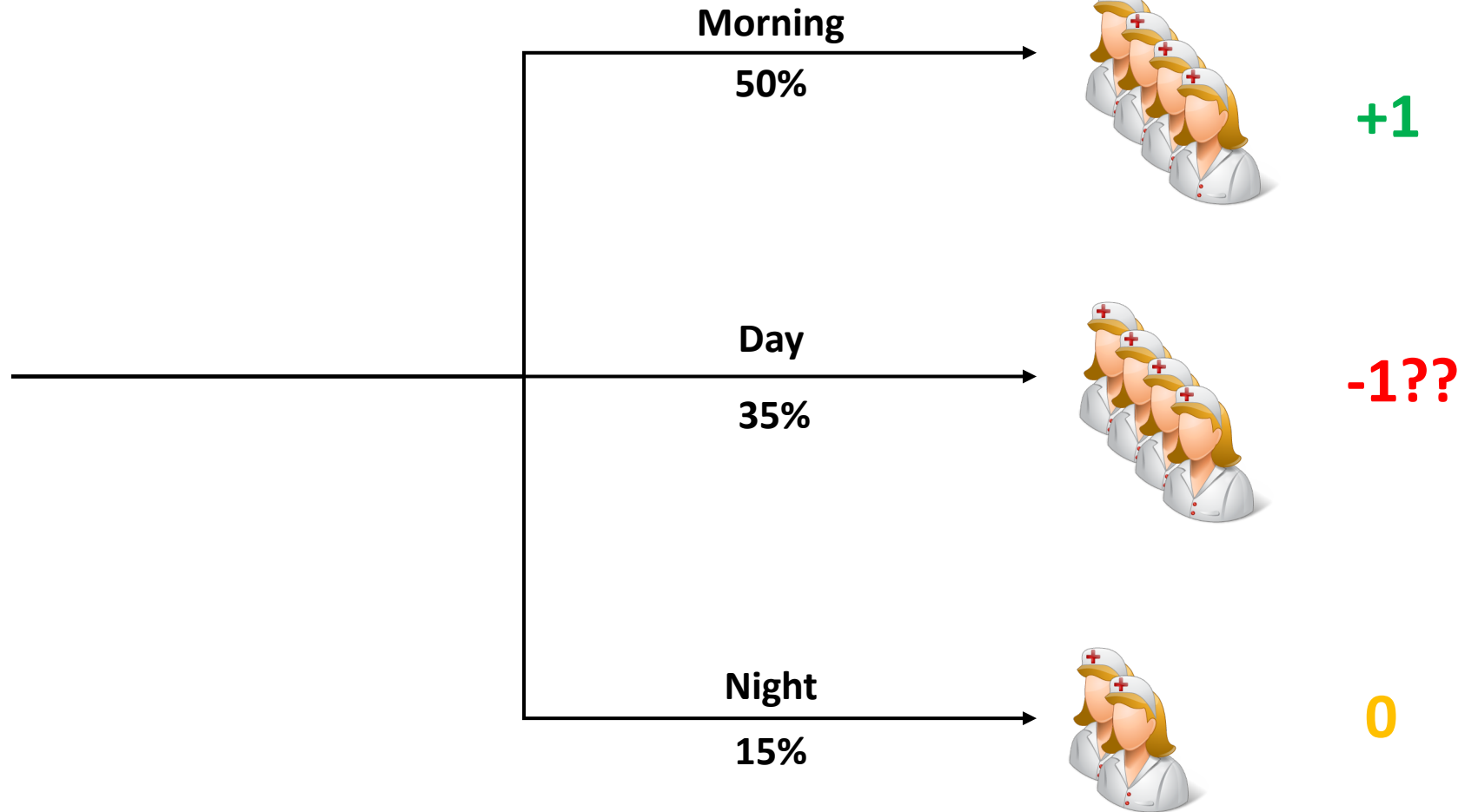
They are able to handle between 10 to 40 patients per shift before diverting patients to other EDs
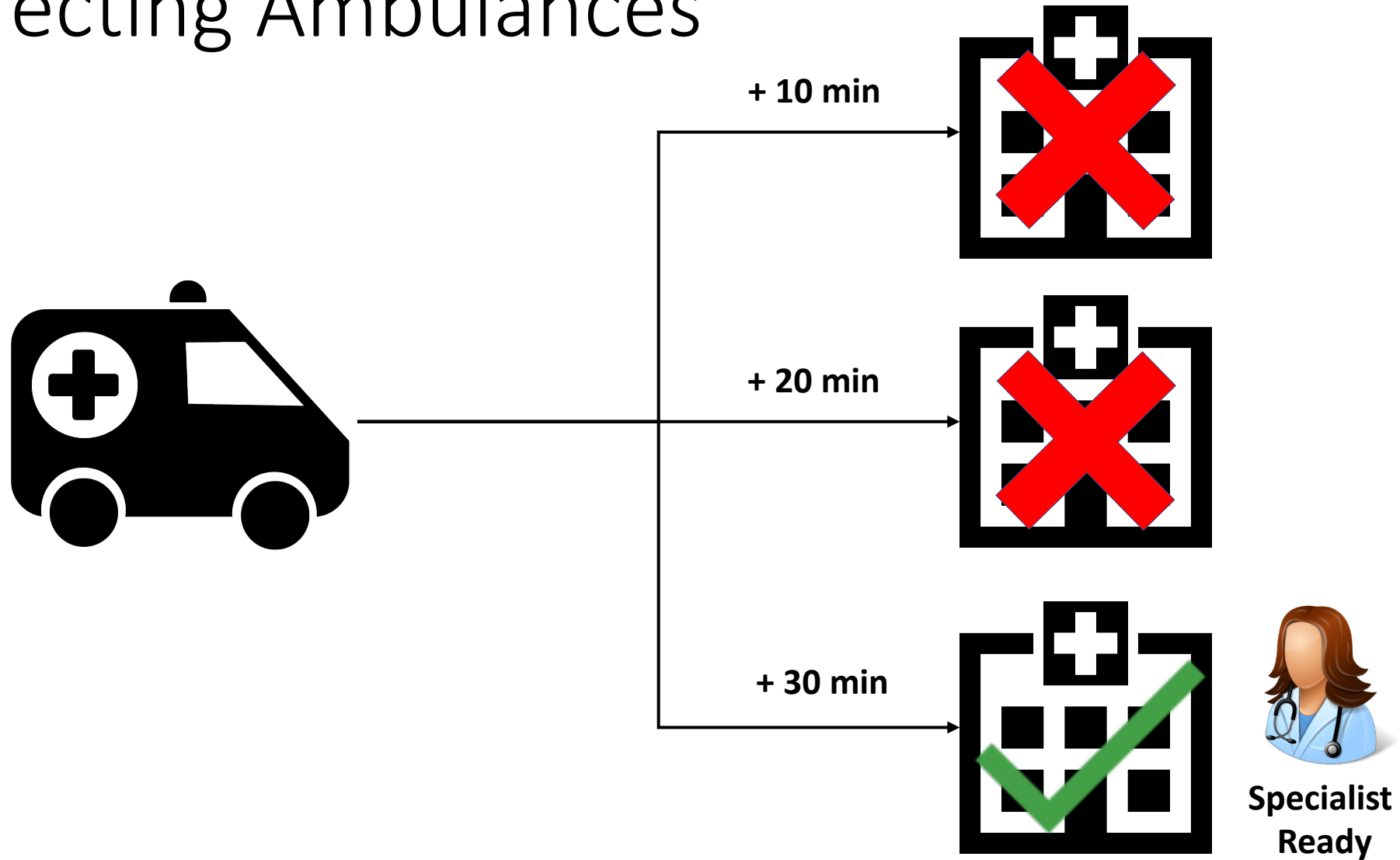
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Predicting Total Inflow and Planning

Staff Planning

100 Patients

Morning

50%

+1

Day

35%

-1??

Night

15%

0

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Directing Ambulances

+ 10 min

+ 20 min

+ 30 min

Specialist Ready

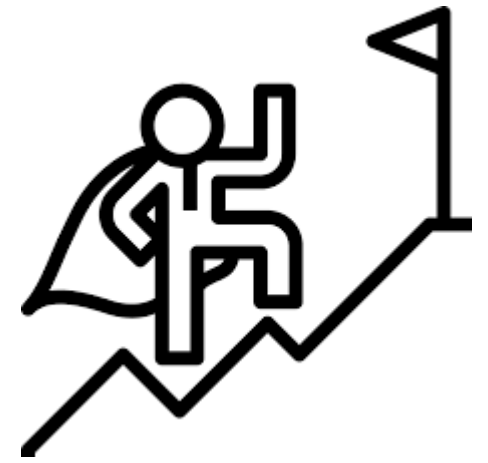Atos

Measures of success

- Reducing emergency stops from ambulance

- Reducing staff workload

- Optimize staff planning and resource allocation

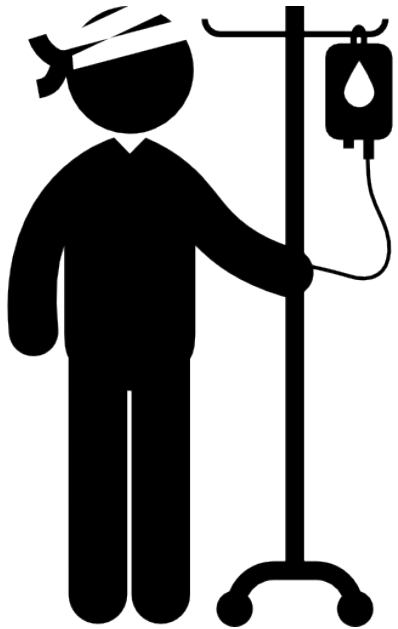- Showing live and future patient inflow

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Prototype Dashboard

- Interactive view to see the live predictions based on input data

- Make available to roster maker with accompanying suggestion

- Start by predicting the next shift and scale to the upcoming week

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Available Data

3 Years of Historical Patient Data

ID (repeatable)
Gender
Age Range
Urgency (Triage)
Illness Type
Time Spent
Exact Timestamp

Additional

Weather   Events

'dayofweek':   0-6
'month':   1-12
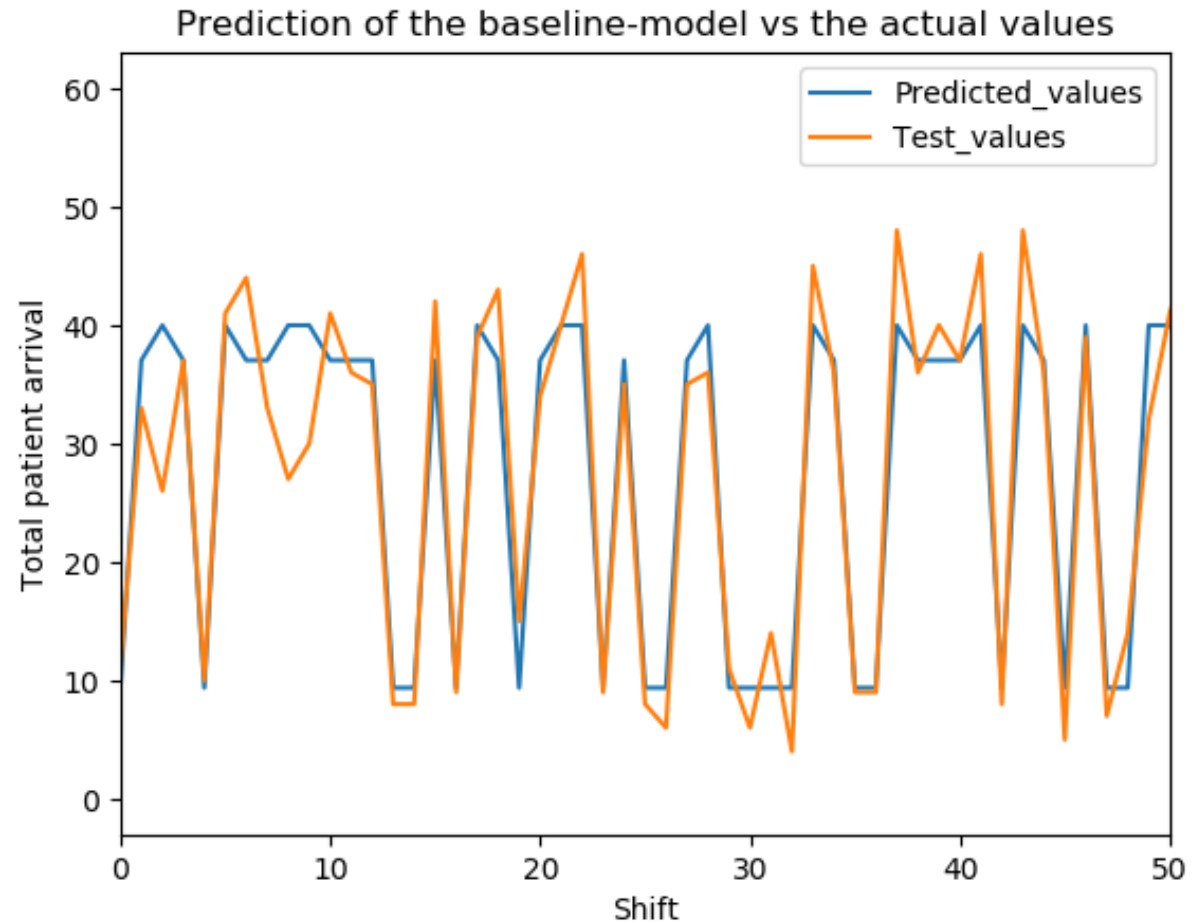'Shift_type':   Shift Times

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Baseline Model

Multiple Regressors tested:

GLM, KNN, Random Forest, Arima, LSTM

- X = Predictors (Shift) over time

- Y = Patient count for next shift

- Accuracy   = 80%

- Max_Error = 22

Prediction of the baseline-model vs the actual values

Work in Progress…

- Change management to dynamically fill rosters
  - Employees prefer knowing further in advance when they need to work

- Implement proactive communications with Ambulances

- Run a live simulation based on newer models

- Define concrete actions that should be taken on model predictions

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Takeaways

- AI can be powerful if applied correctly

- Applied Machine Learning is about identifying relevant business processes and providing relevant insights to **take actions**

- Solutions are applicable cross-industry and should be **implemented creatively**

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Thank you !

@ Atos: "We help you drive operational excellence through

Analytics & AI integration services"

For more information please join us at Atos Booth and contact us

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