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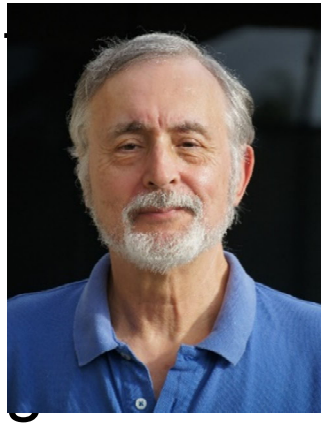
Solve problems before they occur with machine learning and analytics

Presenter:

Steve Blais, PMP, PMI-PBA

Author, Consultant, Teacher and Coach

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Steve Blais, PMP, PMI-PBA, is an author, consultant, teacher and coach who has over 55 years' experience in Information Technologies working as a programmer, project manager, business analyst, system analyst, manager, and tester.

He is the author of Business Analysis: Best Practices for Success (John Wiley, 2011) and co-author of Business Analysis for Practitioners: a Practice Guide (PMI, 2014) and a contributor to the Business Analyst Body of Knowledge, V3 (IIBA, 2015). His new book, The Digital Transformation of Business Analysis, published by IIBA Press, will be out at the end of the year.

Traditionally

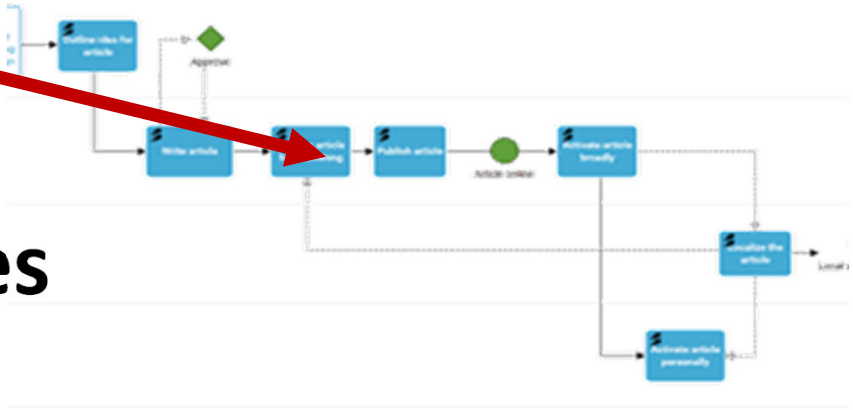
Current State

The business analyst solves problems

Identify the problem

Define the solution / requirements

Implement the solution

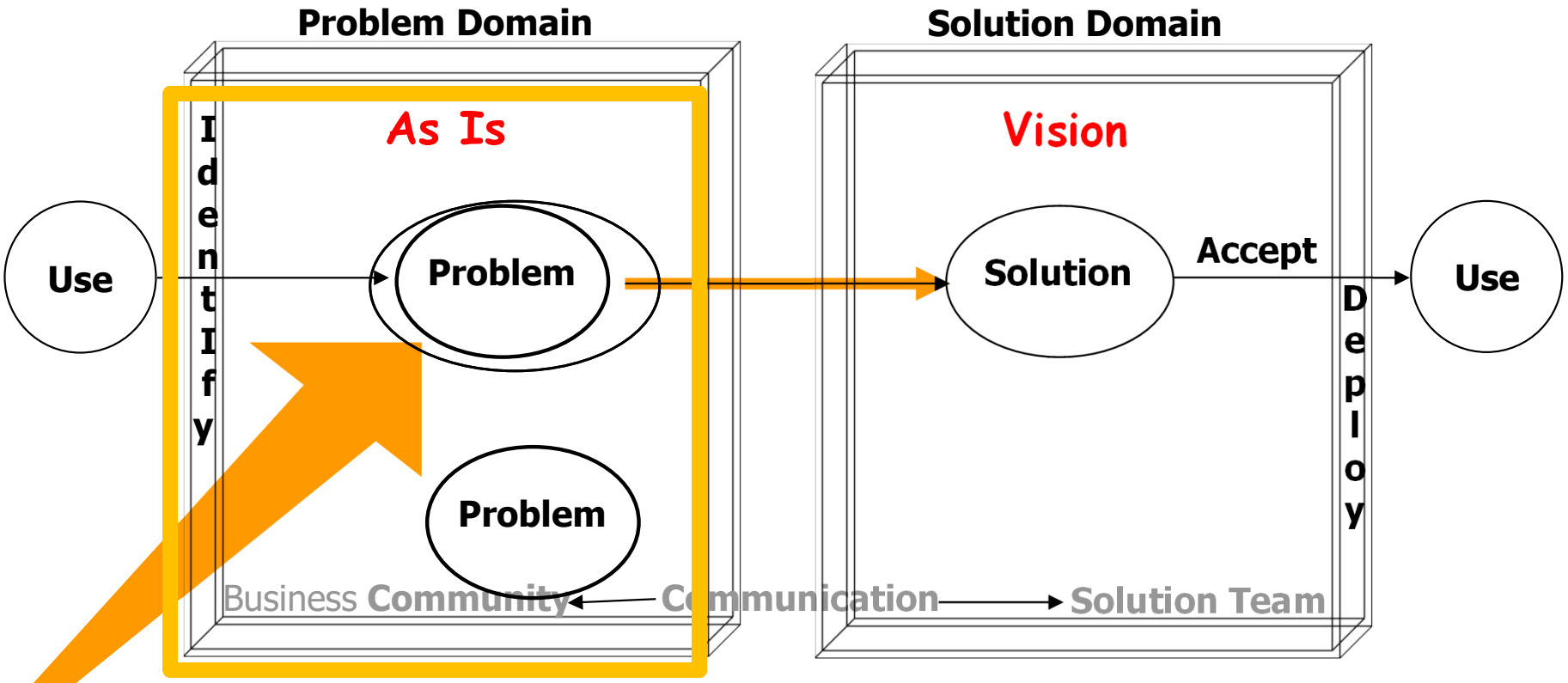


In business processes

Future State

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Traditional Practical Issues



"I need this new feature and I need it yesterday"

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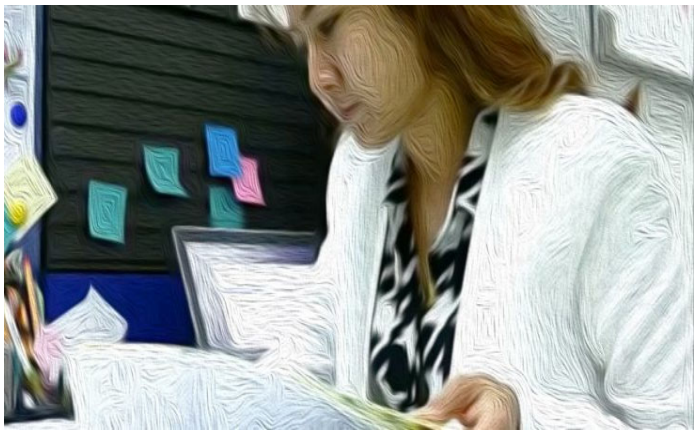
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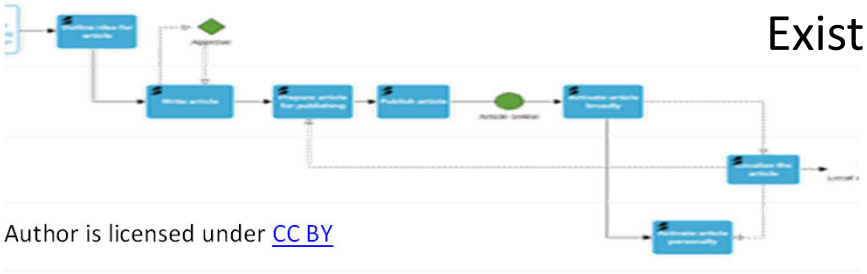
Yesterday's challenge



Information gathering sessions



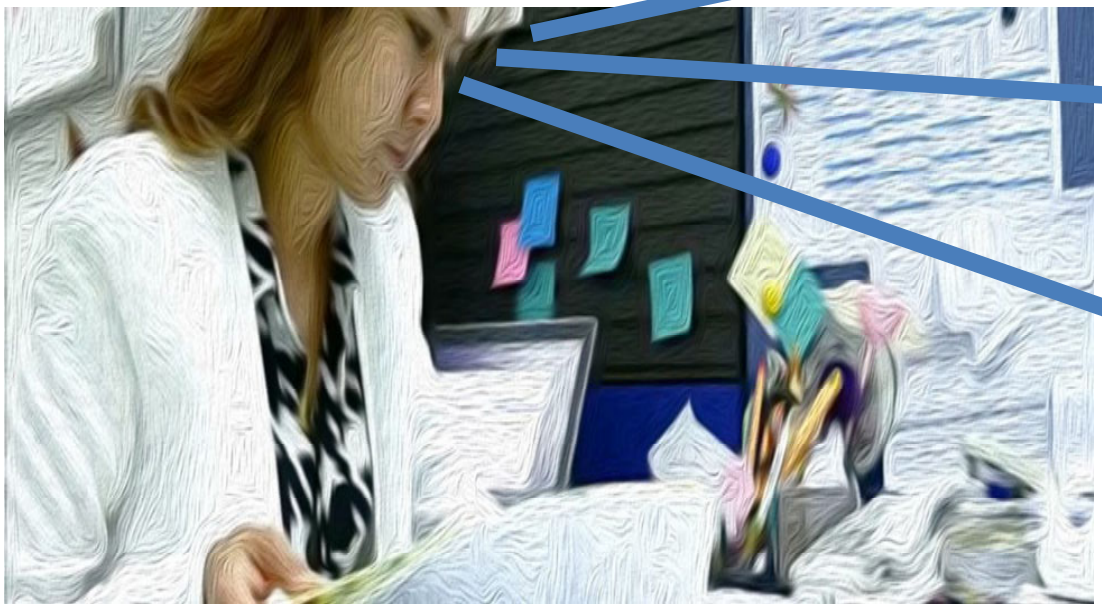




Existing documentation

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Todays challenge



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Data-driven
no process

No problem
to start with

Digital transformation

direct interaction and input from external customers

Strategic and tactical decision-making

- predictive analytics
- diagnostic and prescriptive analytics

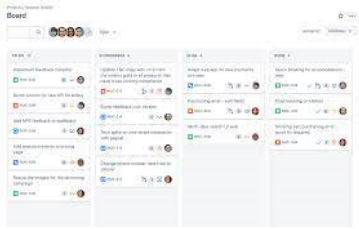
Innovation

- new product ideas
- new markets and customer base
- new approaches to production or services

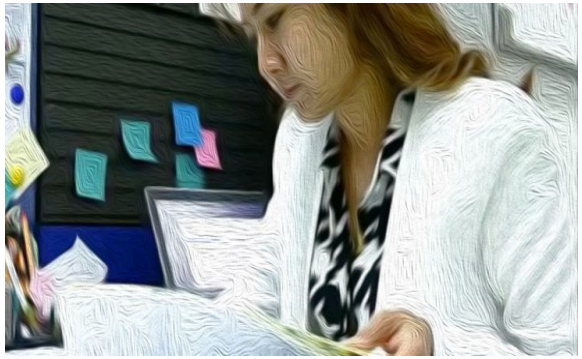
Example: Business analysis requirements

The exact requirement you want is… Somewhere

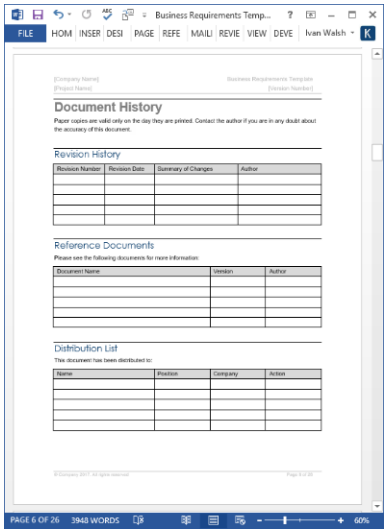




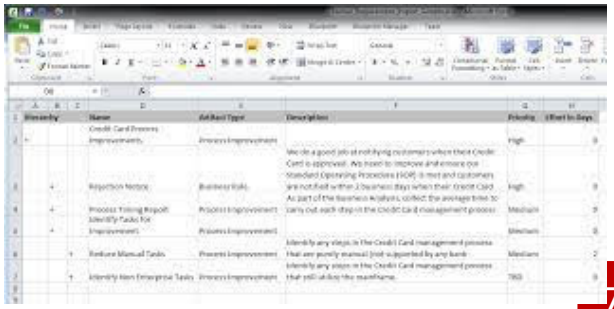












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BA challenge 1: questions

- **Using data from yesterday to determine what to do today and what might be done tomorrow**
- **Helping to make sense of the large amount of data available to the organization**

Customer Predilections

Current and future trends

New revenue streams

"Fool proof" decisions

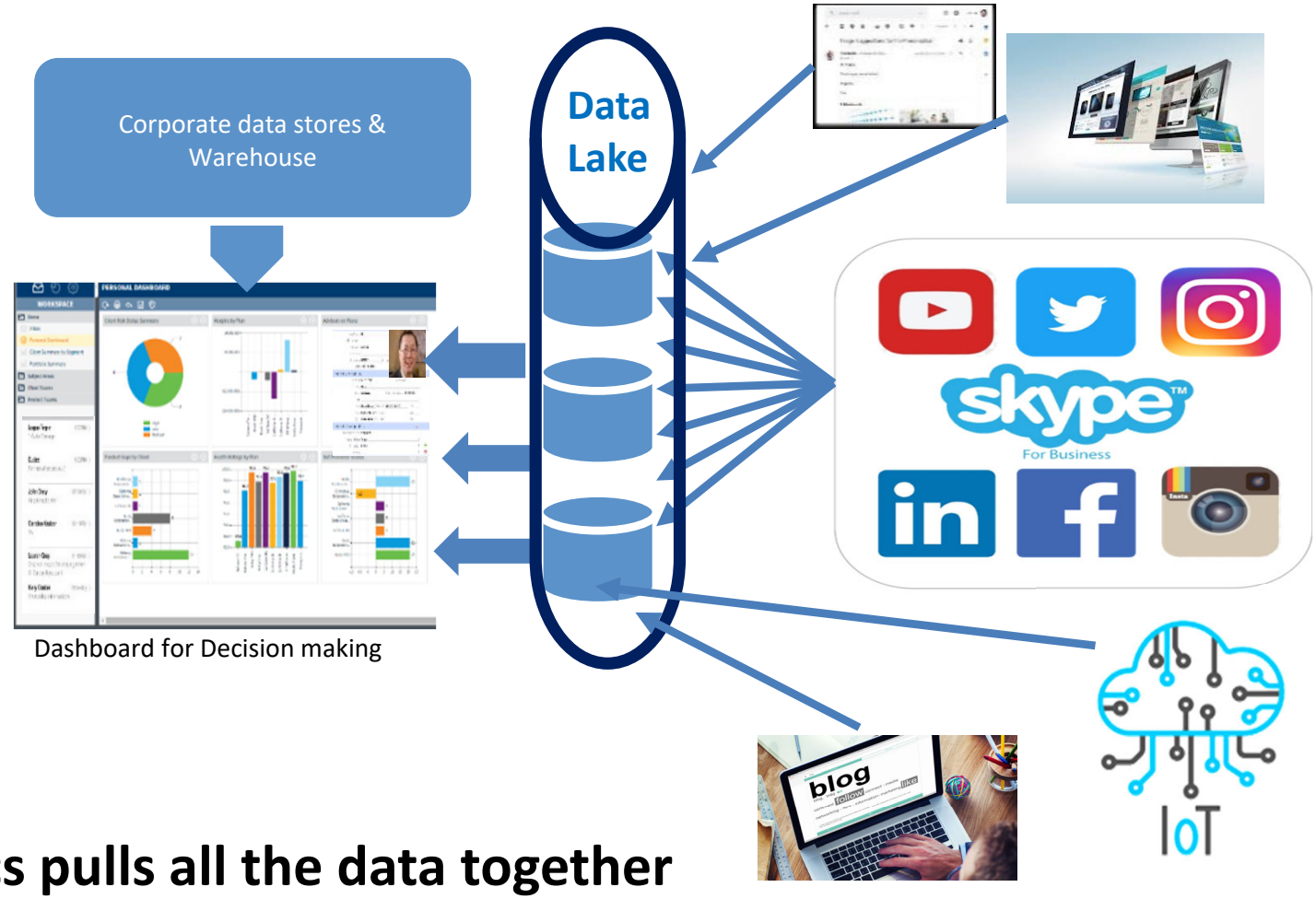
The "next big thing"

Anticipate / predict problems and issues

Recommend solutions and options

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BA challenge 2: identifying the data sources



Dashboard for Decision making

Analytics pulls all the data together

Machine learning performs the machinations

Data visualization displays the results on the dashboard

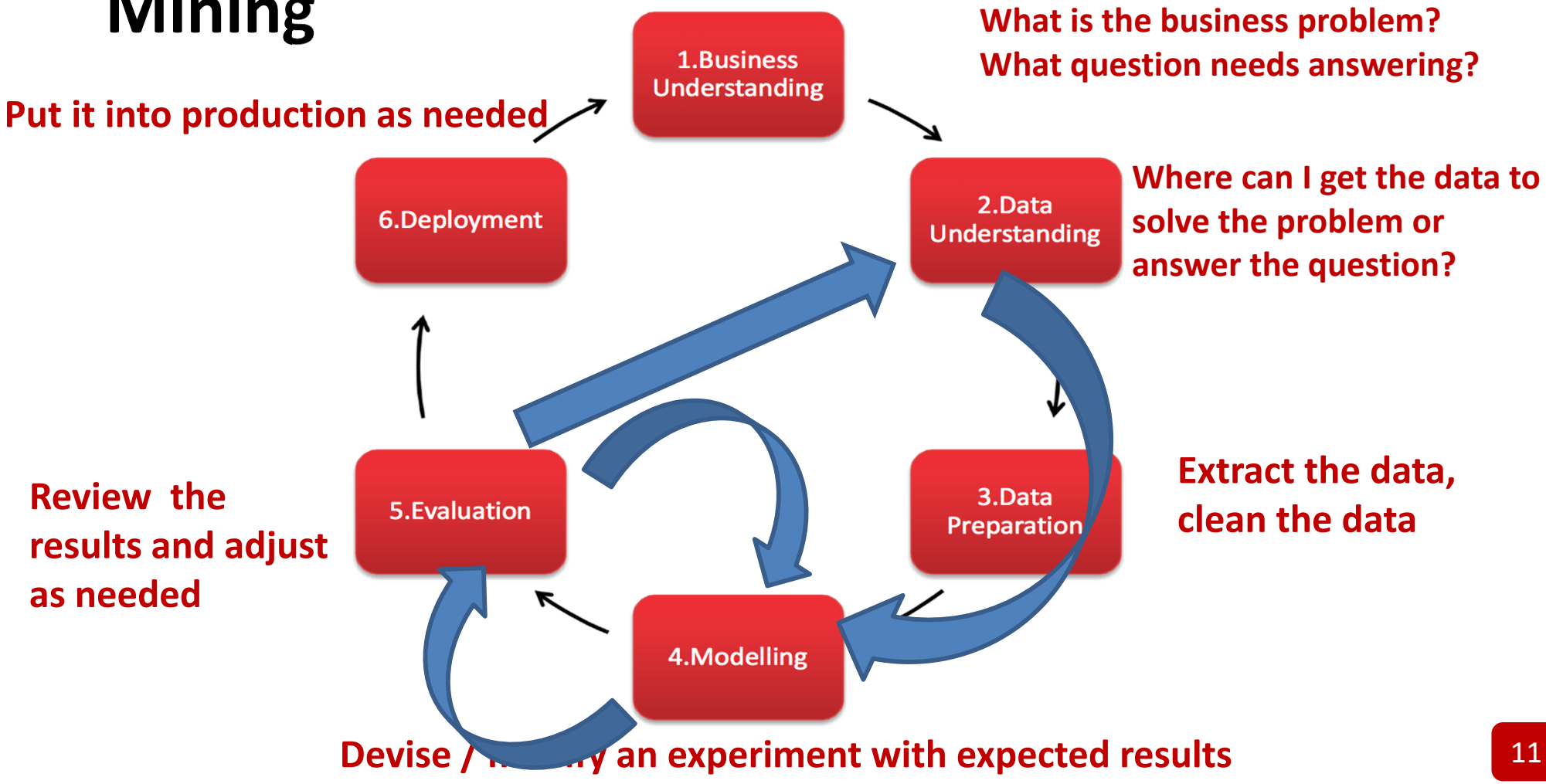
Advantages of analytics and Machine Learning

- **Ability to process and analyze significantly more data**
- **Identify or highlight trends and patterns in the data**
- **Little or no human intervention needed**
- **Reduce or eliminate normal human biases in evaluation**
- **Identify anomalies and anomalous behavior**

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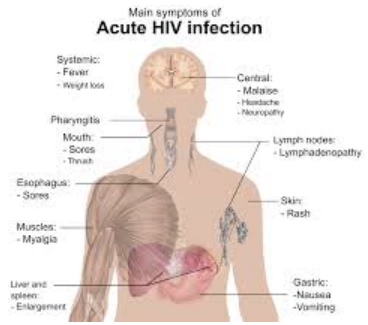
A Little bit about Machine Learning

- **Cross Industry Standard Process for Data Mining**

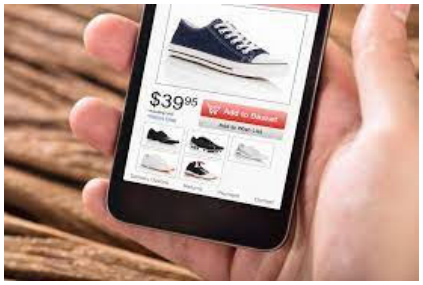


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Examples of Machine Learning Applications



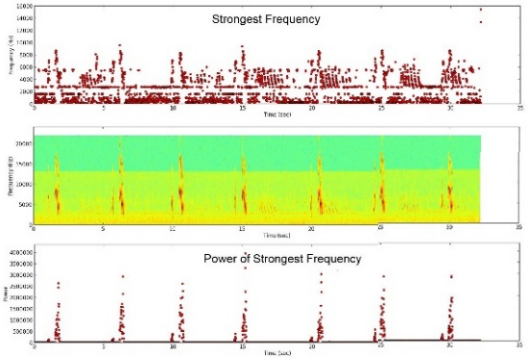
Detect early onset of infection



Product recommendations



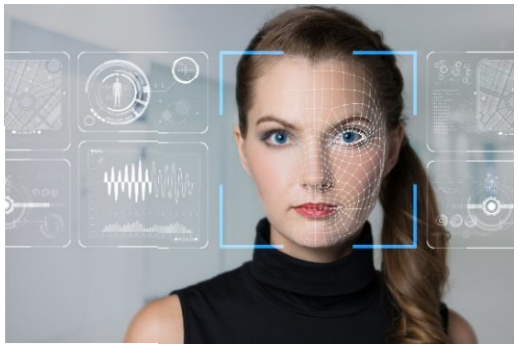
Identify potential problems from patterns



Voice recognition



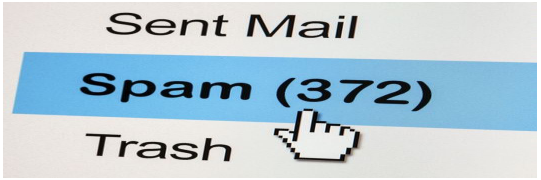
Virtual assistant



Facial recognition



Automated phone response

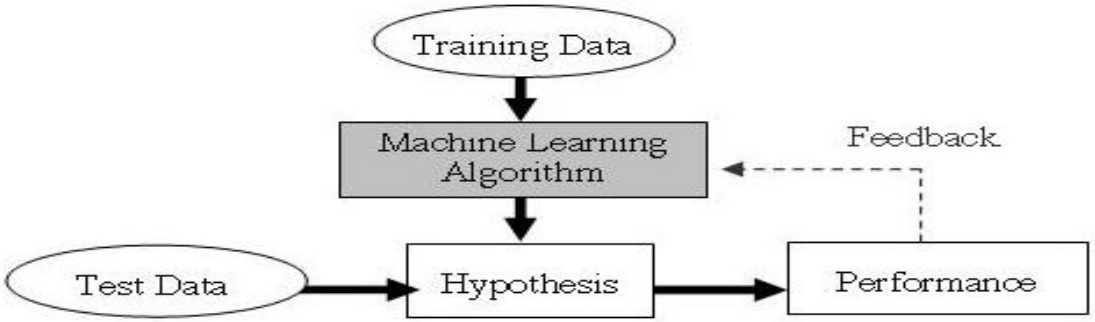


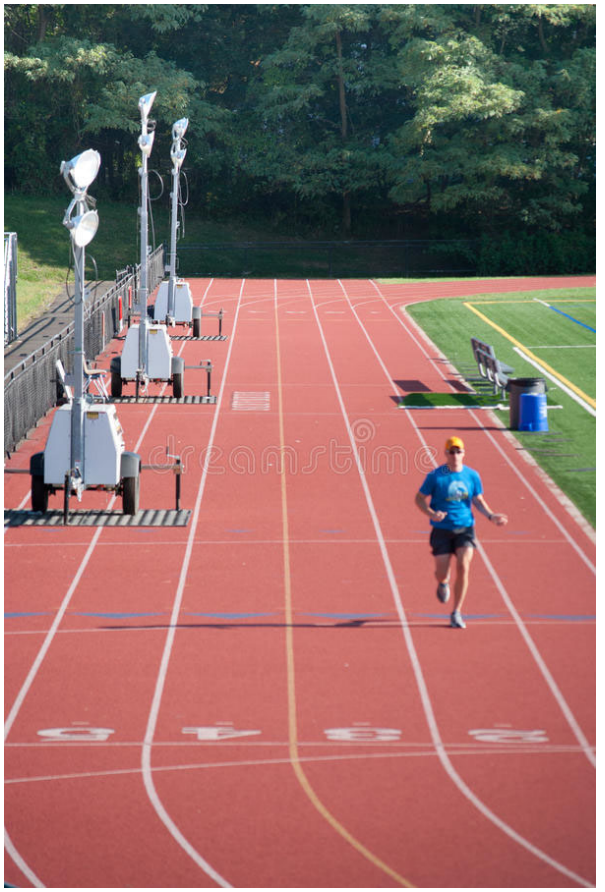
Spam identification and filtering

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How Machine Learning "Learns"

- **Consider running around a track**
- **Repeating the same process**
- **Start at zero**
- **Continually add information**





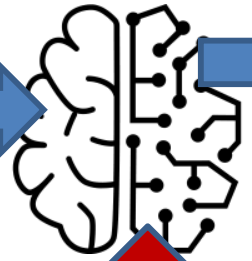
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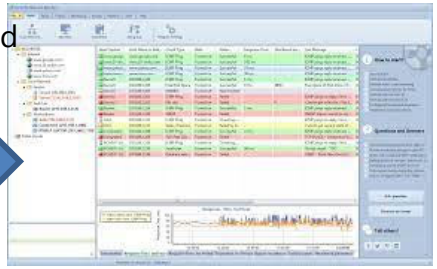
Learning to predict fraud

Data from all activity



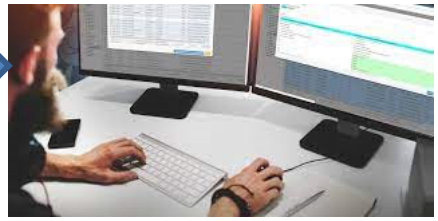
Identities suspicious activity – anomalies and outliers



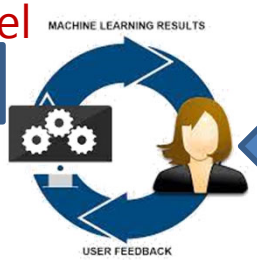


Generate list of potential fraud attacks

Human Analyst reviews attacks and confirms those that are actual attacks



Use new supervised model
In conjunction with
Unsupervised model

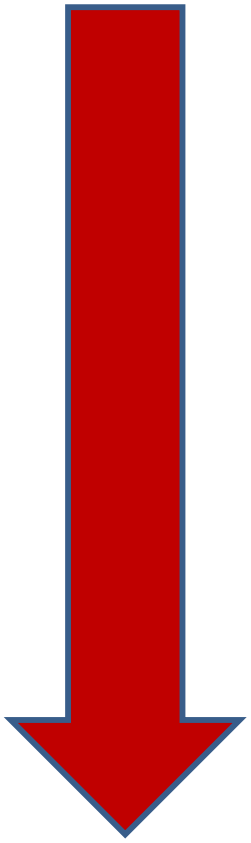


System incorporates the feedback from the human analyst to learn about attacks and create a supervised model

Subsequent days the feedback is incorporated in to the supervised model To get to 85% accuracy

Machine learning finds problems

- **Descriptive analytics**
- **Diagnostic analytics**
- **Predictive analytics**
- **Prescriptive analytics**
- **Behavioral analytics**
- **Sentiment analytics**



Increased involvement or use of machine learning

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Descriptive Data Analytics

- **What is going on right now?**
- **Descriptive Analytic includes**
  - ad hoc reports, basic queries, dashboards, scorecards
  - graphs and charts and general reporting
  - alerts
  - various drill down techniques.

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BA challenge 3: identifying current problems

- **Variations from long-term trends**
- **Recurring anomalies**
- **Negative changes in year on year performance**
- **Failure to meet KPIs**

Major drawback: descriptive analytics show only what has already happened

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Diagnostic Data Analytics



- **Coupled with descriptive analytics, it answers the question: “why?”**
- **Example medicine**
  - **Descriptive analytics determines the cause of the symptoms**
  - **Diagnostic analytics suggests treatments and medication**
- **It uses such techniques such as**
  - **drill-down**
  - **data discovery**
  - **correlations and patterns**

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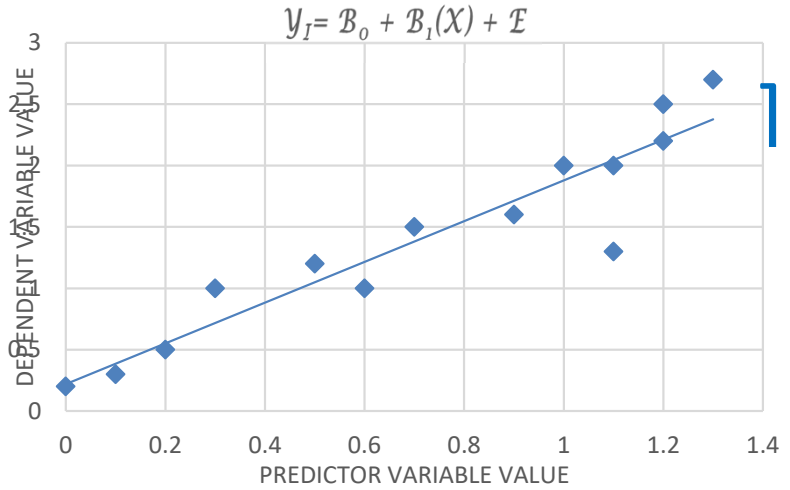
BA challenge 4: complications in solving problems

- **Diagnostic analytics identifies root cause of an occurrence or a trend**
- **More dependent on data sources: fix similar solutions**
- **Typically defines one cause or offers up multiple alternatives**
- **Depends on correct description of symptoms**

Major drawback: diagnostic analytics needs current reference data

Predictive Data Analytics

- **Use of data, statistical algorithms and machine learning techniques to identify the likelihood of future outcomes**
- **"What are the chances that…"**
- **"What could/might happen?"**
- **"Where will we likely be?" at some point in the future within a give set of variables.**



BA challenge 5: identifying potential and future problems

- **Predictive analytics computes the probabilities for potential outcomes**
- **Results tightly tied to the accuracy and reliability of data being used**
- **True views of future require full inclusion of variables**
- **Filter and eliminate distracting and low percentage occurrences**

Problem: how do you solve a problem that has not occurred yet?

Prescriptive Data Analytics

- **Used in conjunction with predictive analytics and / or diagnostic analytics**
- **Analyzes possible solutions and recommends likely courses of action**
  - How to resolve or fix a negative situation
  - How to increase the possibility of a positive situation



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BA challenge 6: the right prescription

- **Identify not only a potential problem, but what to do about it**
- **Steps to take to avoid the problem**
- **Steps to take to mitigate the problem**
- **Prescriptions and solutions based on previous success in similar situation**
- **Recommendations based on "objective" evaluation of “objective" data**

Problem: What is the impact of this prescription or recommendation?

Example project management: Problems / Issues

So, what problems do projects and project managers have?

- **Assembling a team of the right people**
- **Getting the entire team to work together as a unit**
- **Dealing with unrealistic management expectations**
- **Negotiating for more funds or resources**
- **Dealing with unrealistic stakeholder expectations**
- **Constant project and technical trade-offs**
- **And so on**

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Project Manager Questions

- **What are the questions or decisions requiring a glimpse into the future?**

Which of the potential candidates will make the best team member?

If I make this change, what effect will it have on either the budget or the timeframe?

How do I know the estimates from my team are right?

How can I tell if we are having communication problems and what do I do about it, if we are?

What it management changes or reduces budget or resources?

What are the real chances that this risk will occur?

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Where do we currently get answers?

- **Peers**
- **The PMI**
- **Other project managers (E.g. the Internet or LinkedIn)**
- **Lessons learned**
- **Ask the team**

Why not?

Peers may not have had experience with that problem or will give you answers reflective of their experience

PMI will give you general answers and tell you how to get answers

Project managers not in your organization do not know your organization's issues and specific circumstances

Where are the lessons learned? Can they be searched for your specific problem? Are the circumstances the same this year as last time it happened?

Has the team responded with solutions? Will they provide a unified answer or get into conflict? What if you decide not to take their advice? Will you suffer a hit on your authority?

What data is needed?

- **Information on all projects ever run in the organization**
- **Information on all similar projects run anywhere**
- **Full job histories and performance on all project team members**
- **And perspective project team members**

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ML Helping the PM

- **Projecting likely need of replacement resources for team members before project ends**
- **using corporate and general retention statistics**
- **using individual employee records for length of time and performance**
- **using project plans, budgets and schedules and previous project performance**

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ML Helping the PM

Identify problem

- Predict availability of candidates at time of departure
- based on government statistics and job board statistics

Offer solution

- Help filter candidates to determine the candidate most likely to be successful in your environment and on your team
- learn what is currently a successful technical member of the team
- eliminate those determined to be unsuited
- recommend those with the best fit

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Choices to make

- **Recognize a problem in the analytics reporting**
  - Solve existing problems or identify new problems
- **What questions to ask**
  - Ask current questions or come up with new questions
- **How to know the problem is solved or the question answered**
  - Considering the possibility of solutions and answers
- **How much to believe the results of the analytics process**

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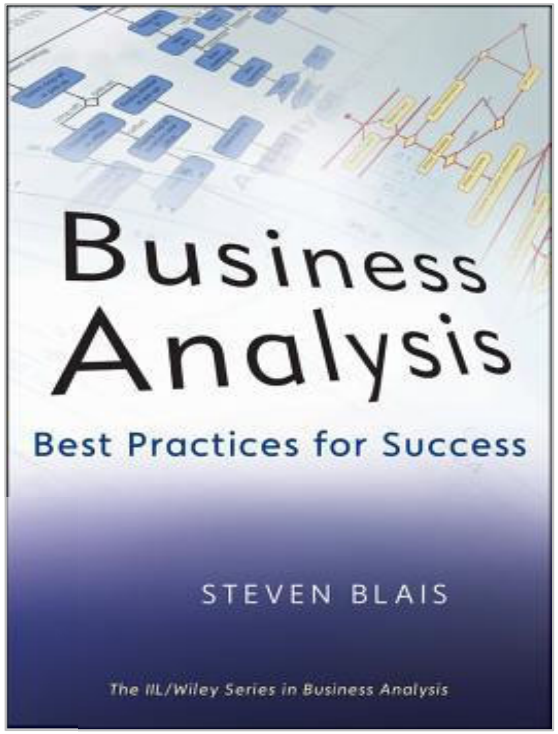
Moving in the right direction

- **Assume anything can be done with machine learning and analytics**
  - All you have to do is ask
  - The answers are in there
- **Therefore:**
  - Refocus your attention on the data around you
  - Tickle your curiosity
  - Move from analysis to analytics
  - Think visually

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Questions and Contact Slide

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