Gartner Toolkit for IT Leaders

Manufacturing AI — Creating Use Cases That Add Business Value

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Who Needs This Toolkit? Why Use It? How to Use It?

- Who?

  – Manufacturing company CIOs, IT leaders, functional leaders

- Why?

  – Generate potential AI use cases that add business value

  – Engage the organization to participate in and champion potential solutions

- How?

  – CIOs: present to business analyst leaders

  – Business analyst leaders: conduct this workshop within their functional teams

This is a follow-up tutorial to the Gartner "Communicate What AI Means in Manufacturing" workshop.

Workshop Objectives

- Explain why AI solutions are essential as strategic enablers in manufacturing

  - The current state of AI in manufacturing and its business value in that industry segment

  - Where and how AI is being used most often

  - Critical success factors and measures of AI success

  - What AI maturity levels mean for deploying AI

- Generate potential use cases that add business value

Current State of AI in Manufacturing

40%

of manufacturers

AI deployed or planned within 12 months

Top Application Types in Use

1. Chatbots

2. Smart robotics (automated warehousing/manufacturing)
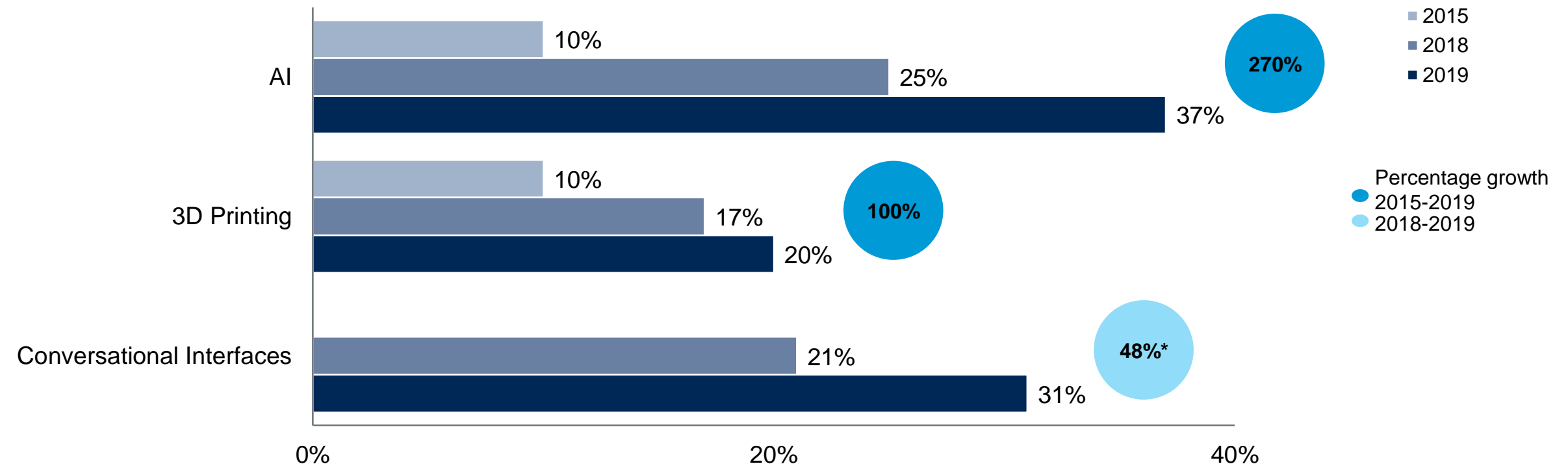
3. Process optimization tools

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AI is Here to Stay

Four-Year Real and Projected Growth of AI

Percentage of respondents that have deployed a technology or are in short-term planning for deployment

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AI-Based Applications in Use in Manufacturing

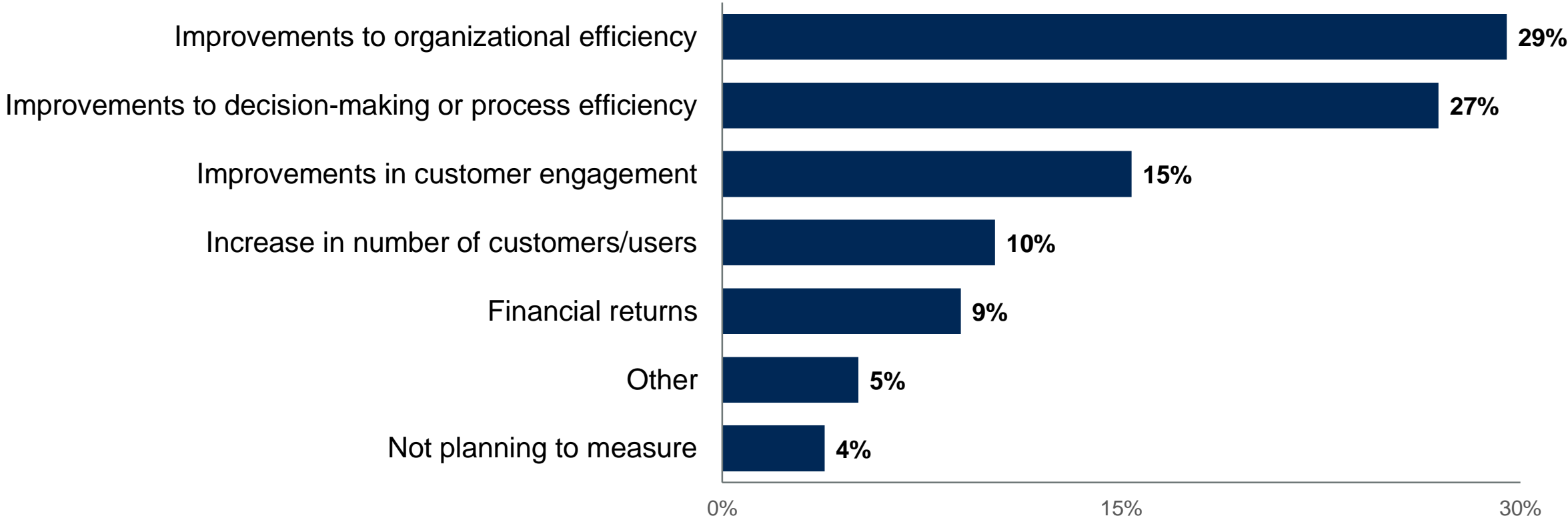|	Automotive (n = 63)	Consumer Products (n = 121)	Construction and Agricultural Equipment (n = 67)	Industrial Equipment (n = 54)	Life Sciences (n = 63)	Other Manufacturing (n = 131)
Process optimization	37%	23%	27%	33%	16%	27%
Smart robotics (automated warehousing/manufacturing)	35%	21%	12%	26%	22%	16%
Self-driving vehicles	33%	3%	9%	7%	0%	5%
Market/consumer segmentation	27%	22%	9%	15%	14%	8%
Chatbots	25%	30%	18%	22%	22%	21%
Anomaly or fraud detection on IoT data	22%	7%	15%	19%	5%	8%
Call-center virtual customer assistants	19%	9%	7%	9%	11%	9%
Sentiment analysis or other opinion-mining analysis	19%	15%	10%	6%	6%	12%
Face detection/recognition	16%	2%	13%	6%	11%	5%
Computer-assisted diagnostics	14%	4%	12%	31%	10%	10%
Fraud analysis on transactional data	13%	18%	22%	11%	13%	11%
HR applications such as resume screening	10%	12%	12%	7%	8%	7%
Virtual personal assistants	5%	4%	4%	6%	5%	9%
None of these	21%	30%	36%	26%	41%	40%

Percentage of Respondents

Q. Does your organization use any of these artificial intelligence (AI)-based applications? Multiple responses allowed.
Base: All Answering, excluding Not sure. n varies by segment

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Measures of Success: Improvements in Organizational Efficiency & Decision Making or Process Efficiency Are the Most Popular

Measures of Success for Current AI/ML Initiatives
Percentage of Respondents, Currently Deployed or Deploying in 0-12 Months

Measure	Percentage
Improvements to organizational efficiency	29%
Improvements to decision-making or process efficiency	27%
Improvements in customer engagement	15%
Increase in number of customers/users	10%
Financial returns	9%
Other	5%
Not planning to measure	4%

0%   15%   30%

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Ideas for AI

Formulation Discovery	IoT Security Management	Predictive Maintenance	Marketing Segmentation
Packaging Simulation	Automated Contract Review	Optimize HVAC Performance	Call Center
Demand Scheduling	Fraud Detection and Prevention	Equipment Longevity Monitoring	Customer Service Case Management
Category Management	Counterfeit Detection and Prevention	Asset Performance Optimization	Service After Sale Trigger
Product Promotions	Regulatory Compliance	Autonomous Robots in Hazardous Conditions	Crowdsourced Quality Control
Price Optimization	Human Capital Mgmt.	Worker Safety	Automated Risk Analysis
Business Scenario Planning	Dynamic Inbox Routing	Plant Efficiency	Uninterrupted Network Operations

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Discussion Questions

- Where do we have holes in our current business? Where do we see opportunities?

  – Reconsider complex problems that have resisted solutions before

  – Look for competitive advantage first, then look for operational advantage

- Which AI use cases would help us to address these challenges?

  – Which ones can we do today? In the future?

  – What other use cases we can envision in a given level of AI capability?

- What is our risk tolerance? How aggressive can we afford to be?

  – How far up and to the right on the framework can we go?

- Do we see business opportunities in developing an AI solution that others in our industry would need?

Critical Success Factors for All AI Solutions

- Solutions must be linked to overall business strategy and specific business objectives.

- Data must be "clean" (harmonized) and of sufficient volume to train the system.

- Remember, data could be anywhere and everywhere! However, good data must be curated and maintained.

- The right set of skills depending on the AI techniques considered.

Thought Starter: The 8 Wastes of Lean Manufacturing

Defects
Plant: Scrap or rework

Office: Bad data, invalid assumptions

Overproduction
Plant: Production before needed

Office: Low-impact reports, redundant copies

Waiting
Plant: Idle equipment, waiting on materials or equipment

Office: Stagnate process flows, slow technology, complicated approval process

Non-Utilized Talent
Plant: Unrecognized information from those on the factory floor

Office: Insufficient training, poor placement and underutilization of skills

Transportation
Plant: Double handling, excessive movement

Office: Proximity to collaborators

Inventory
Plant: Obsolescence, poor use of capital, overpurchasing

Office: Backlog of files, service backlog, obsolete files, corrupted data

Motion
Plant: Unnecessary movement of people, equipment or machinery — includes labor-intensive tasks

Office: Searching for files, duplicate data entry, excessive mouse clicks

Overprocessing
Plant: Deliver superior product absent price justification. Overengineering

Office: Excessive and potentially redundant data entry and reporting, excessive approval process

Defects

Over-Production

Waiting

Non-Utilized Talent

Transportation

Inventory

Motion

Over-processing

*The eighth waste is not part of the original TPS model.

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Breakout Sessions: Brainstorm Ideas and Create Potential Use Cases and Solutions

Worksheet | Idea Generation

Idea	Description	Business Value	Data Sources
Dynamic inbox routing	Tag, classify and prioritize email, link to calendar schedules and balance workload	Efficiency, cost reduction	Email, eFax, voicemail

Generate Revenue

Eliminate Waste

Improve Customer Experience

Improve Margin

Detect Fraud

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Breakout Sessions: Present Use Cases and Solution Ideas

- What was easy?

- What was hard?

- What solution(s) do you want to pursue first?

- What were the obstacles you identified in the exercise?

- Did this exercise energize you to adopt AI solutions? Why/Why not?

- Other feedback?

Recommendations

- Become an AI champion the chief evangelizer for:
  - What AI is
  - How it works
  - How to better link AI to business strategy
- Build a culture of experimentation.
- Combine IT and OT to increase data sources, volume.
- Use POCs to build a platform, beware of siloed implementations.
- Incorporate new regulatory, ethical and contextual considerations.
- Every AI effort should be supported by a business goal.
- Consider partnerships with suppliers and customers — what are they're plans?
- Consider participation in manufacturing AI consortium?
- Create a Google alert for new information on manufacturing and IT.
- Add the AI agenda to your Gartner key initiative update.

Wrap-Up and Q&A

- Workshop objectives review

- Final questions/concerns/issues

Appendix

Appendix

- Optional Slides
  - AI Techniques (Computer Engineering Discipline) (audience-dependent)
  - Worksheet — Idea Generation
  - Some Thoughts About Resourcing (audience-dependent)
- Optional Exercise — Opportunity to Realization … and Back
- Gartner Research — AI Maturity Model
- Gartner Research — AI Vendors and Resources
- Gartner Research — AI Use Cases
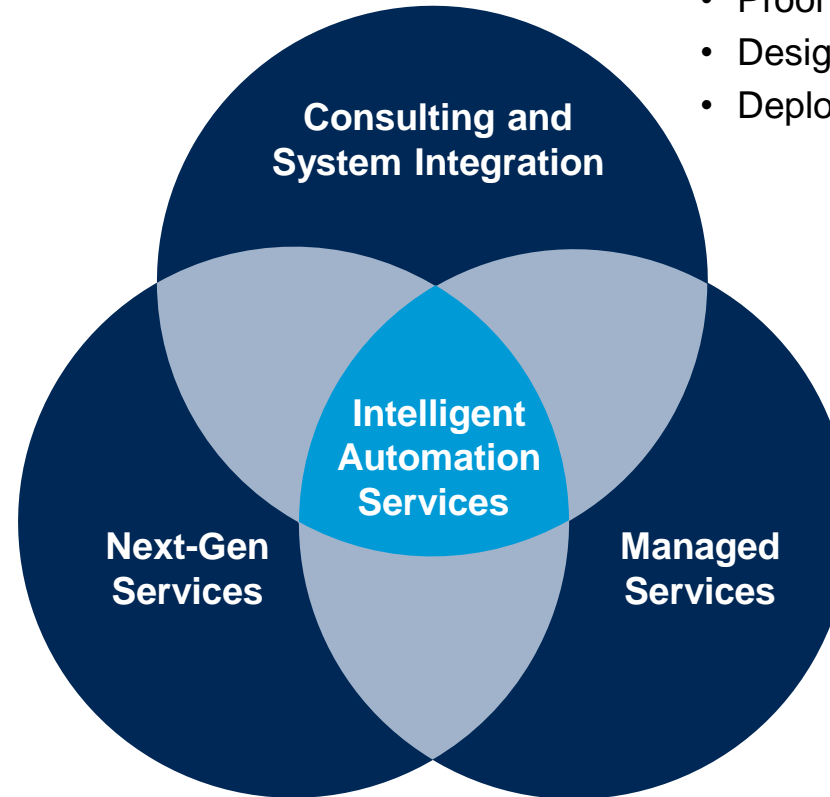- Gartner Research — Survey Responses and AI Research Roundup

Appendix: Optional Exercise — Opportunity to Realization ... and Back
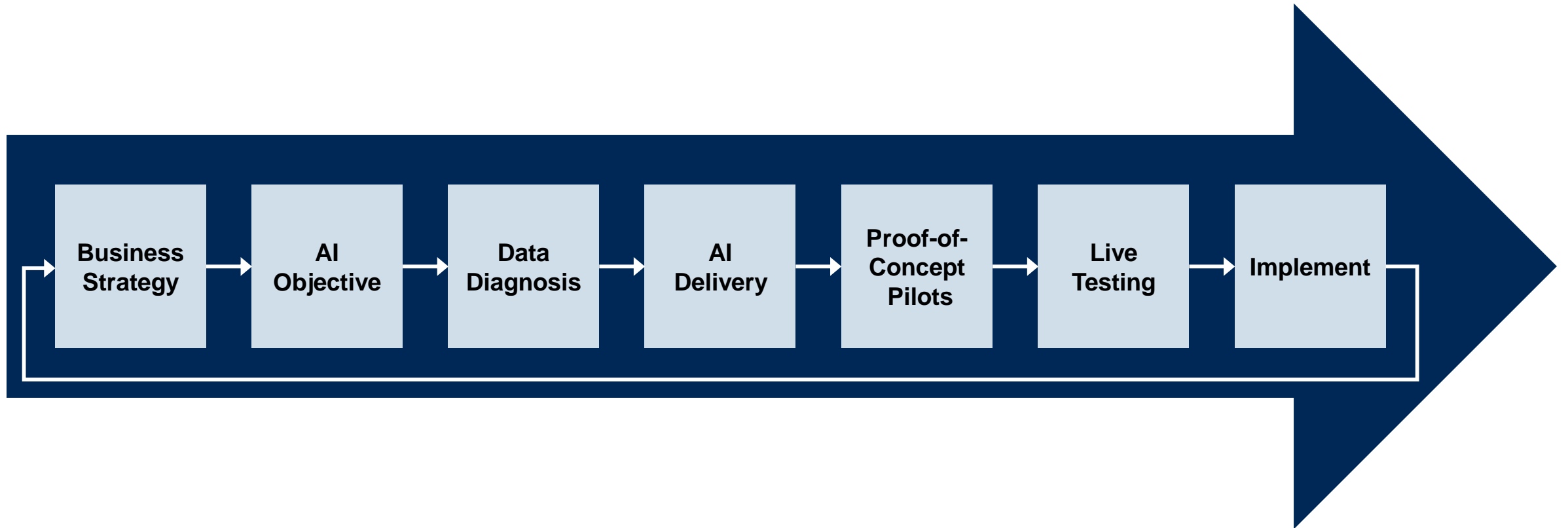
Appendix: Some Thoughts About Resourcing

Intelligent Automation Services

- Ideation/use case identification
- Proof of concept/blueprint
- Design/configuration
- Deploy/integrate and curate

Consulting and System Integration

Intelligent Automation Services

Next-Gen Services

Managed Services

- Industry-specific BPaaS with AI engines
- Horizontal utility services
- Ecosystems

- Platform BPS
- Managed service of custom solution
- Application management
- Infrastructure operations

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Appendix: Gartner Research — AI Vendors and Resources

AI Disciplines	Open-Source Packages	Cloud-Based Services	COTS (Commercial Off-the-Shelf)
Computer Vision	• OpenBR • OpenCV • TensorFlow • Tesseract OCR	• Amazon — Rekognition • Google — Vision API • IBM — Watson Visual Recognition • Microsoft — Computer Vision API	• ABBYY • Affectiva • Captiva • Clarifai • MathWorks
Language Processing	• Natural Language Toolkit • Rasa NLU • spaCy.io • Stanford' s CoreNLP	• Amazon — Lex • Google — Dialogflow IBM — Watson Conversations • Microsoft — LUIS	• BotCore.ai • Kore.ai • Parlo • Recime
Machine Learning	• TensorFlow • scikit-learn • spaCy.io • Oryx.io	• Amazon — Machine Learning • Google — Cloud Machine Learning Engine • IBM — Watson Machine Learning • Microsoft — Azure Machine Learning Studio	• Dataiku • H2O.ai • KNIME • RapidMiner

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Appendix: Gartner Research — AI Use Cases (1/2)

Marketing
"How AI Transforms Your Marketing Organization" G00705023

Sales
"Use AI to Improve the Sales and Customer Experience" G00382514

Finance
"When and Where to Use Robotic Process Automation in Finance and Accounting" G00377790

Legal and Procurement
"Use Smart Contracts and AI to Drive Value From Data Investments" G00351393

Human Resources
"AI Use Cases in Human Capital Management Technology" G00384495

Appendix: Gartner Research — AI Use Cases (2/2)

Innovation

"Raise Your Product Innovation Quotient With Edge AI" G00375254

Production

"A Comprehensive AI-Enabled Predictive Maintenance Plan Starts With Business Understanding" G00372907

Supply Chain

"Find Inspiration in 10 Use Cases of Artificial Intelligence in the Supply Chain" G00337824

"Supply Chain — A Supply Chain Analytics Leader's Due Diligence Checklist for AI Projects" G00370036

Customer Experience

"How General Managers Can Drive Outstanding Customer Experience Through AI" G00382699

Appendix: Gartner Research — Gartner Survey Responses and AI Research Roundup

Gartner Survey Responses Regarding AI
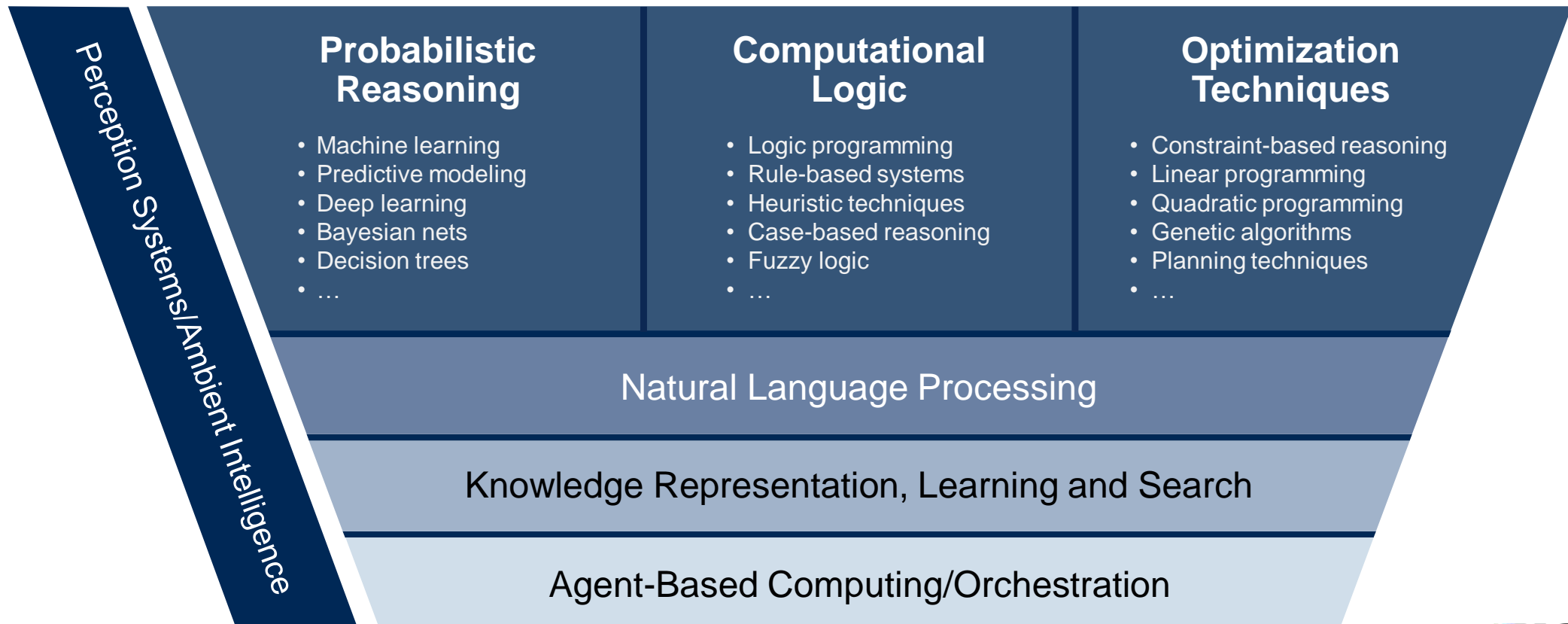
- "2019 CIO Survey: CIOs Have Awoken to the Importance of AI" G00375246

- "Survey Analysis: Mind the Gap Between How AI Is Viewed by Employers and Employees" G00377719

AI Research Roundup

- "A Framework for Applying AI in the Enterprise" G00368243

AI Techniques (Computer Engineering Discipline)

Artificial intelligence (AI) applies advanced analysis and logic-based techniques including machine learning to interpret events, support and automate decisions, and to take actions.

Perception Systems/Ambient Intelligence

Probabilistic Reasoning

- Machine learning
- Predictive modeling
- Deep learning
- Bayesian nets
- Decision trees
- …

Computational Logic

- Logic programming
- Rule-based systems
- Heuristic techniques
- Case-based reasoning
- Fuzzy logic
- …

Optimization Techniques

- Constraint-based reasoning
- Linear programming
- Quadratic programming
- Genetic algorithms
- Planning techniques
- …

Natural Language Processing

Knowledge Representation, Learning and Search

Agent-Based Computing/Orchestration

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Thank You

If you'd like to learn more about how AI can impact your business, I would be happy to schedule a call with our AI and IoT Lead Konrad Konarski.

I hope this guide helps you on your AI Journey!

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Conducting the Breakout Sessions — DO NOT DISPLAY FOR PARTICIPANTS

Logistics

- Groups of four participants (maximum per group)

- 30 minutes to complete the task

- Each group will present its ideas

Guiding Principles

- Use cases and ideas tied to business goals/outcomes

- Collaboration

- Creativity

- Freedom of expression

- No judgment

- Repeat exercise as often as needed after the workshop concludes

Supplies

- Blank worksheets (one per group and extras)

- Completed worksheet example (one per group)

- Sticky notes

- Flip charts (one per group)

- Marker pens and ballpoint pens

Presenting Breakout Session Results — DO NOT DISPLAY FOR PARTICIPANTS

- Each group:

  – Presents ideas

  – Asks for feedback

  – Answers questions