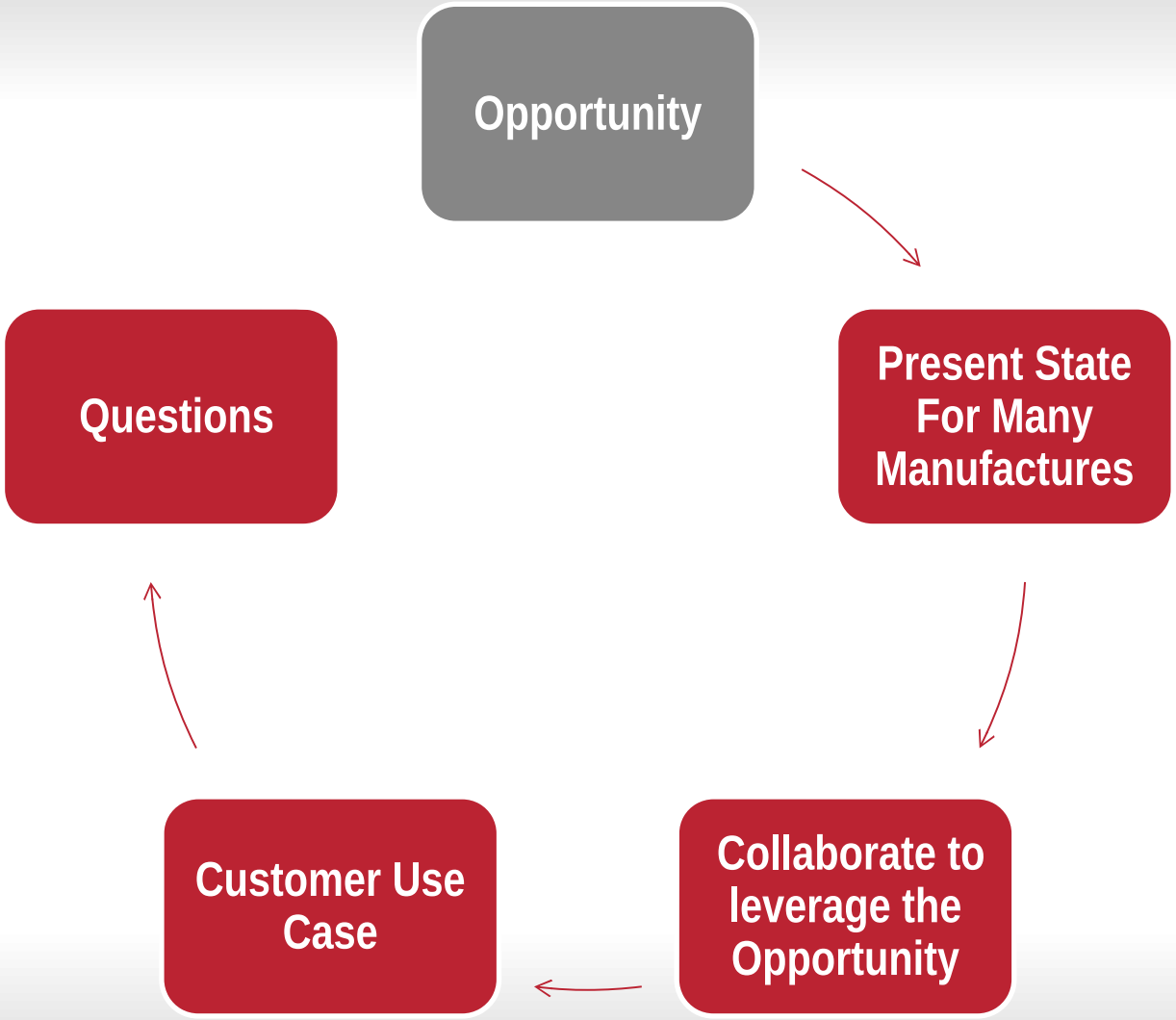
LISTEN. THINK. SOLVE.®

Driving Operational Performance by building Manufacturing Capability one step at a time…..

Phillip Terlesk

Agenda



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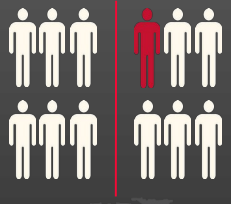
Global population will exceed 7 billion

More than 70 million will enter the middle class



Middle class adding $8 US trillion to consumer spend

BEST IN CLASS DEMANDS

- Operating Excellence
- Compliance
- Dynamic Value Creation

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Growth Matrix – Wine is a STAR!

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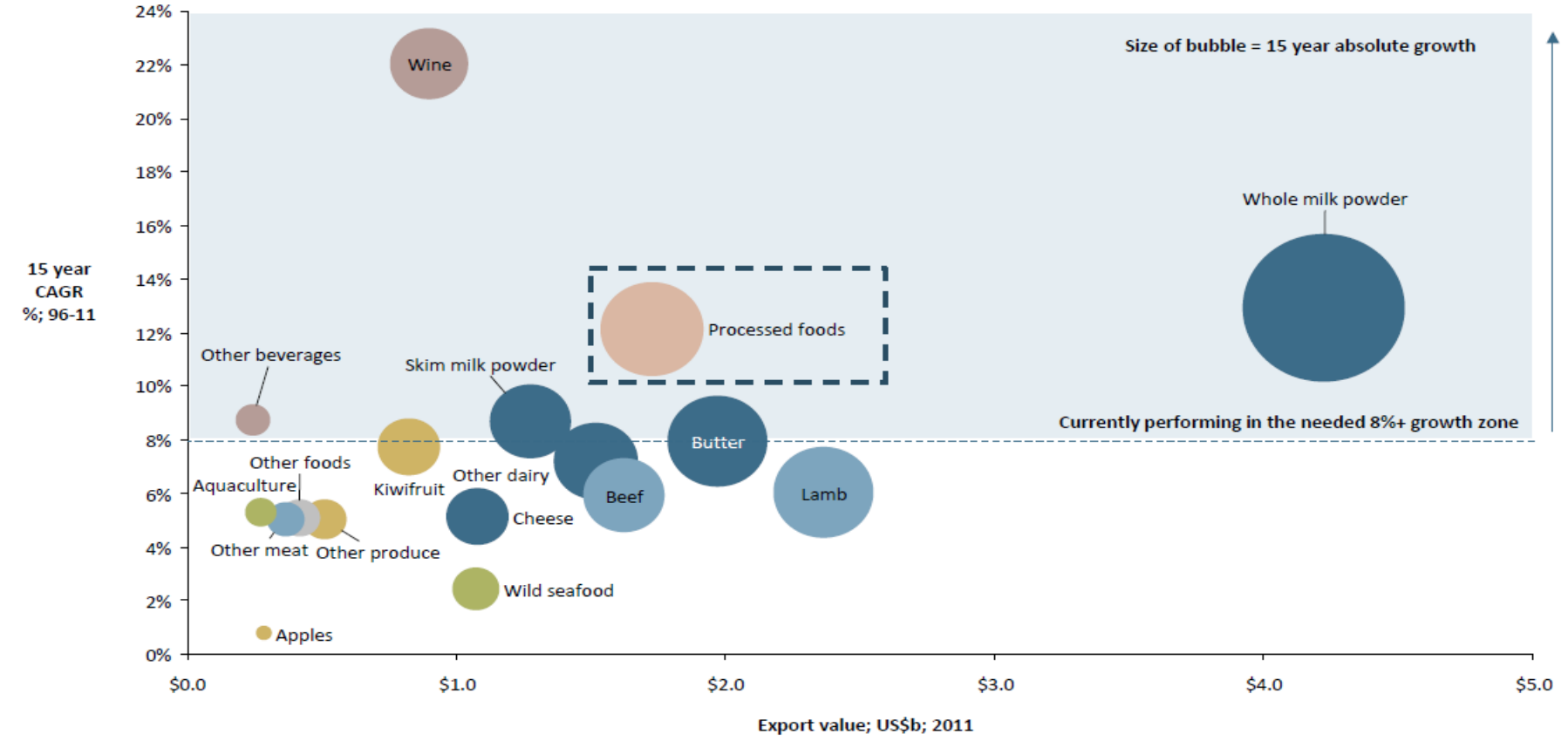
F&B EXPORTS – GROWTH MATRIX

Growth performance varies by segment; dairy, beverages and processed foods are the key growth standouts; our research suggests **processed foods** has **best potential** for **creating required growth**

New Zealand food & beverage export matrix by major product segment: export value vs. rate of growth vs. absolute growth
(US$b; 1996 vs. 2011)



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Growth Matrix – Infant Formula

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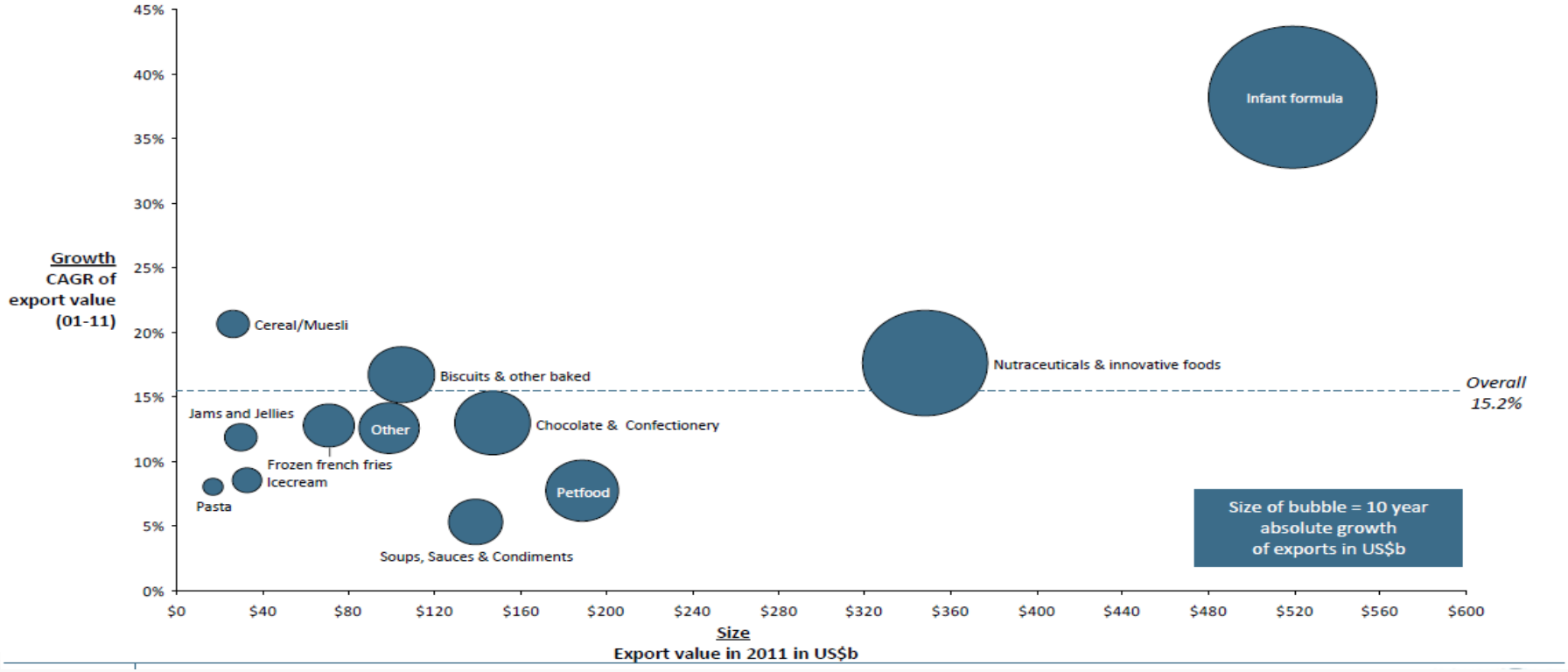
GROWTH MATRIX

Infant formula and "**nutraceuticals & innovative foods**" are **leading the way** in absolute value and growth of processed foods exports

Export value of key products in 2011 vs. 10 year CAGR of export value vs. 10 year absolute growth in exports
(US$b; FOB; nominal; 2001v2011)



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Infant Formula / Nutritional Powders

Rockwell Automation

INFANT FORMULA/NUTRITIONAL POWDERS [190110,190190]

QUANTITATIVE

Quantitative Scorecard

Export value (US$m; 11)	
- NZ	$519m
- Global	$11,467m
5y CAGR (US$; 06-11)	
- NZ	14%
- Global	14%
Absolute 5y growth (06-11)	
- NZ	+$253m
- Global	+$5,383m
$/kg (US$; 11)	
- NZ	$5.25
- Global	$3.24
Global share of trade:	
- Top 3 importers	23%
- Top 3 exporters	34%
- New Zealand export	5%

Global market Major importing countries

Country	Import Share	Imports (US$m)	5y CAGR (06-11)	5y ABS (06-11)	$/kg (2011)
World	100%	$9,970	13%	4,443	$ 3.29
China	13%	$1,269	35%	990	$ 8.63
United Kingdom	5%	$ 532	10%	204	$ 4.09
Japan	5%	$ 477	7%	129	$ 1.65
Malaysia	4%	$ 397	11%	167	$ 3.10
Saudi Arabia [1]	4%	$ 384	15%	167	$ 10.74
Thailand	3%	$ 321	15%	161	$ 3.85
Germany	3%	$ 293	5%	63	$ 3.11
Canada	3%	$ 287	10%	109	$ 2.77
France	3%	$ 286	12%	121	$ 2.73
Russia	3%	$ 279	24%	184	$ 4.47

Major exporting countries

Country	Export Share	Exports (US$m)	5y CAGR (06-11)	5y ABS (06-11)	$/kg (2011)
World	100%	$11,467	14%	5,383	$3.24
Ireland	12%	$ 1,426	9%	481	$5.30
Netherlands[1]	12%	$ 1,390	21%	745	$4.84
France	10%	$ 1,129	14%	544	$3.52
Singapore	9%	$979	21%	597	$3.48
Germany	8%	$946	8%	313	$2.54
USA	5%	$524	9%	185	$1.65
New Zealand	5%	$519	14%	253	$5.25
Malaysia	4%	$455	23%	293	$2.01
Belgium	4%	$453	14%	218	$2.18
Australia	3%	$391	72%	364	$4.08

Key NZ metrics

	2011	10y CAGR (01-11)
# employed in processing	N/A	N/A
# of enterprises	N/A	N/A

Key NZ firms

Fonterra, Dairy Goat Co-operative, GMP Pharmaceuticals, sutton group, NEW IMAGE GROUP, synlait, NZDL, DANONE NUTRICIA, HEINZ Nurture baby, vitaco biolife, carrickmore, homecare

Numerous others...

New Zealand exports by destination

Country	Export Share	Exports (US$m)	5y CAGR (06-11)	5y ABS (06-11)	$/kg (2011)
World	100%	$519	14%	$253	$ 5.25
China	22%	$114	19%	$ 66	$ 7.57
Nigeria	16%	$ 83	20%	$ 49	$ 3.30
Australia	10%	$ 51	13%	$ 23	$ 5.97
Malaysia	8%	$ 39	9%	$ 14	$ 4.58
Thailand	8%	$ 39	9%	$ 14	$ 5.10

New Zealand imports

Total	0.4%	$43	73%	$40	$3.36

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Value Add will drive growth

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SHIFT FROM COMMODITIES

NZ Inc. needs to continue transitioning **away from** the **volume & price** driven mindset in order to realise growth potential

- "We have to **move beyond price**. In most of our traditional products and markets it's all price, price, price. New Zealand can't win on price, not in our niche categories; it has to be value and innovation. It takes time to get beyond price. Even the Americans and the Europeans can beat us on price, even with higher labour costs they have huge automated factories. In NZ we only have that in dairy." *CEO, mid sized, NZ owned*

- "We are **still concentrating** on the **primary end** of the value chain, rather than the value-added end: it's still lamb chops and dairy products. The only way to **grow** is through **higher value products**. **We produce great products and not great brands**." *CEO, mid sized, NZ owned*

- "New Zealand has a **farming mentality**, looking at farm gate prices. It's a battle to get farmers to think bigger. If they want consistent returns, they need to look at the consumer." *Marketing Manager, mid-sized NZ owned*

- "We are **still exporting thousands of sacks of milk powder**. We need to shift from this commodity position." *MD, mid sized, NZ owned*

- "We have to **add value**. We have to have a point of difference and be **leading and innovative**." *MD, small-mid, NZ family owned*

- "We are too **constrained by our inputs**. We **can't just keep going for volume**. We need to export processed foods." *CEO mid sized, NZ owned*

- "Last month, the new Fonterra Darfield plant sent it's first shipment of milk powder to China. It is being made into dairy beverages. **How much of that value could be kept in New Zealand?** Does Fonterra own or have a JV with the company making it into a beverage in China?" *CEO mid sized, NZ owned*

- "We have to **learn how to premiumise** our dairy, fruit, beef and lamb. Make them exclusive. We need to promote the "no nasties", top notch quality. Its not the R&D, it's the marketing, the story, the brand." *CEO, mid sized, NZ owned*

- "Selling **low value commodities in bulk is not the future**. That is such a competitive market. We need to balance the volume and the value." *Export Manager, large NZ owned business*

- "It has to be **added value products** that we are exporting. We need to turn that milk powder into chocolate and infant formula." *CEO mid sized, NZ owned*

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Adding Value will build export $$

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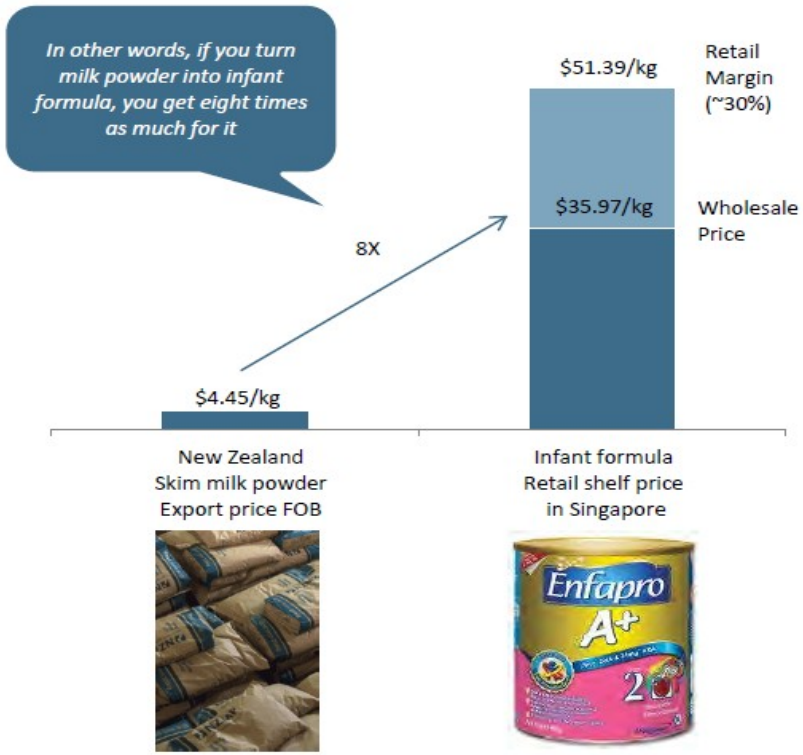
HOW TO ADD VALUE

The phrase "**adding value**" is often discussed; a comparison of the FOB price NZ Inc. received for milk powder with the retail price of infant formula gives a real-world example of how this is done

New Zealand FOB price of SMP vs retail price of infant formula in Singapore
(NZ$/kilogram; Sept 2012)



Ingredients: (in order of volume)

Nonfat Milk Powder, Lactose, High Oleic Safflower Oil, Soy Oil, Coconut Oil, Whey Protein Concentrate.

In addition, less than 2% of the following: Potassium Citrate, Calcium Carbonate, Ascorbic Acid, Potassium Chloride, Magnesium Chloride, Ferrous Sulfate, Choline Chloride, Choline Bitartrate, Ascorbyl Palmitate, Sodium Chloride, Taurine, m-Inositol, Zinc Sulfate, Mixed Tocopherols, Niacinamide, d-Alpha-Tocopheryl Acetate, Calcium Pantothenate, L-Carnitine, Cupric Sulfate, Vitamin A Palmitate, Thiamine Chloride Hydrochloride, Riboflavin, Pyridoxine Hydrochloride, Beta-Carotene, Folic Acid, Manganese Sulfate, Phylloquinone, Biotin, Sodium Selenate, Vitamin D_3, Cyanocobalamin, Calcium Phosphate, Potassium Phosphate, Potassium Hydroxide, and Nucleotides (Adenosine 5'-Monophosphate, Cytidine 5'-Monophosphate, Disodium Guanosine 5'-Monophosphate, Disodium Uridine 5'-Monophosphate)

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Dynamic Value Creation

Succeeding in a Changing Market Place

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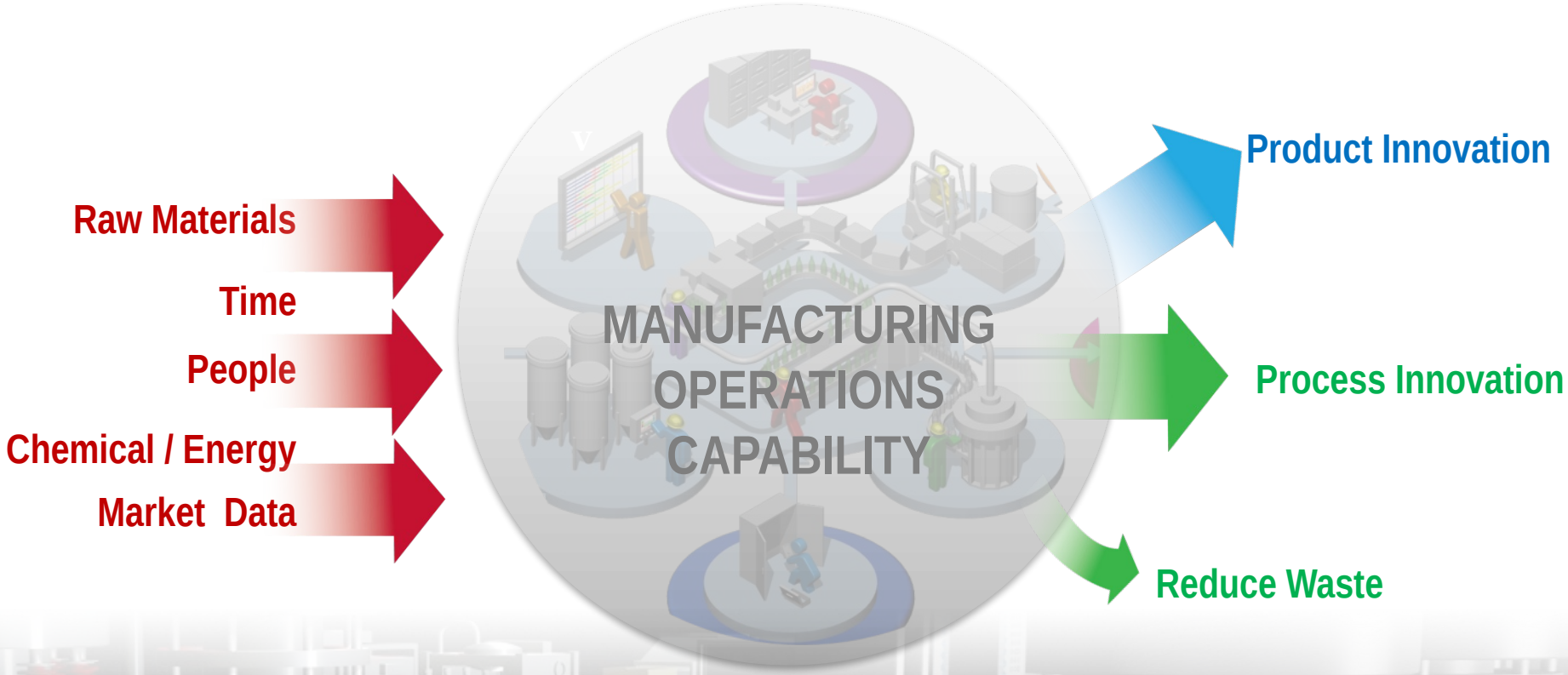
Capability To Bring Profitable Products to Market Faster



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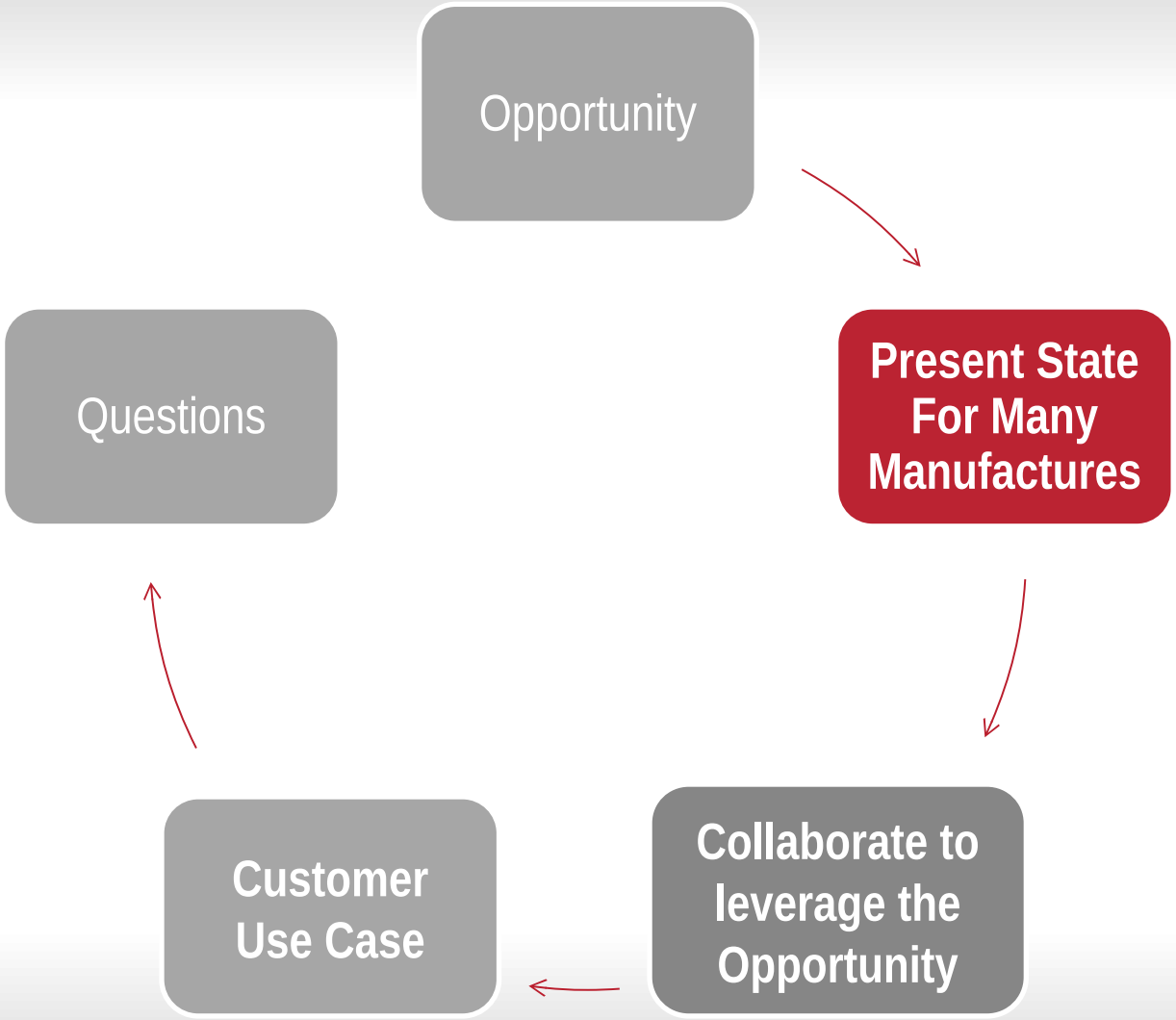

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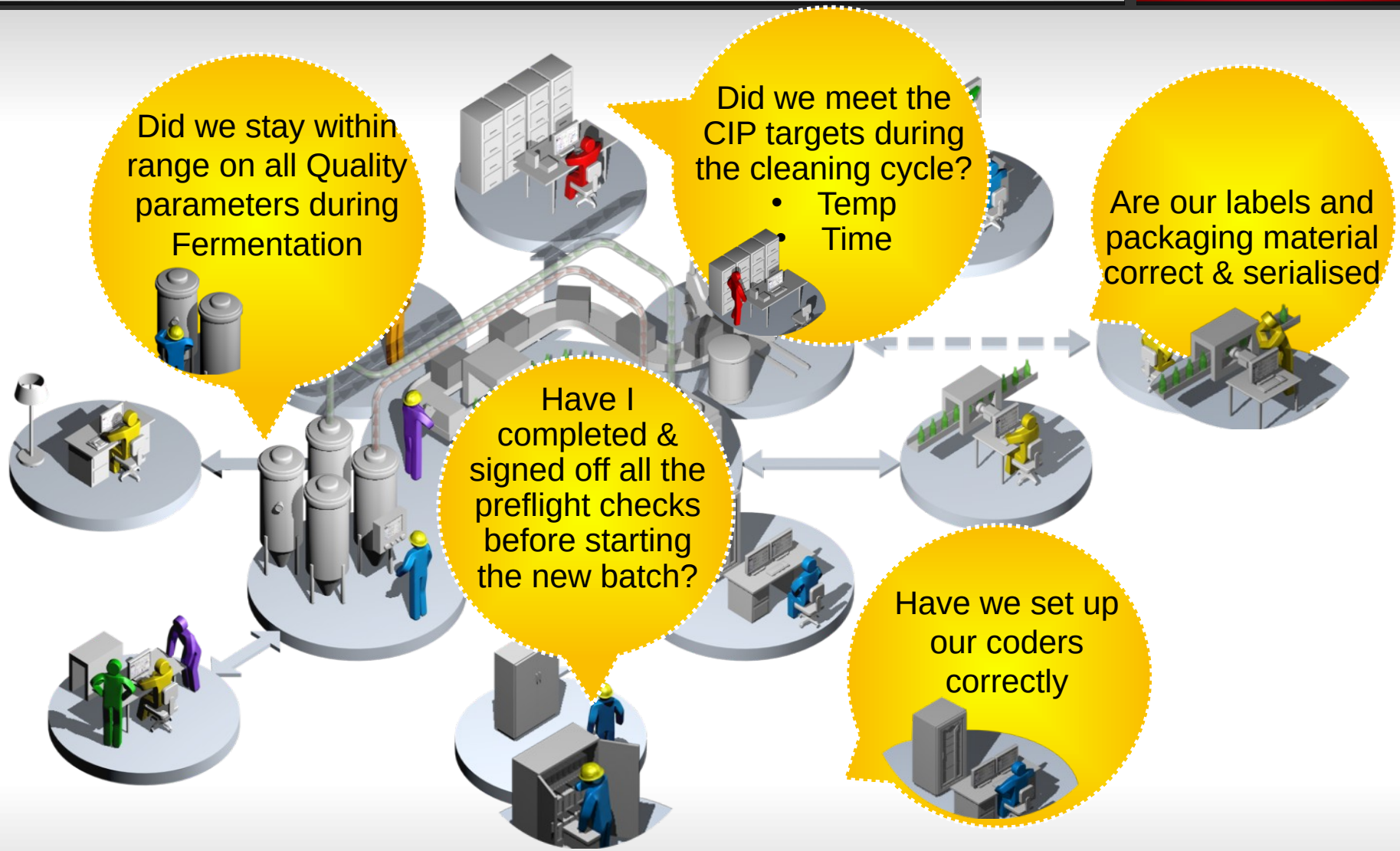
Questions We Face On a Daily Basis ?



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Business, IT & Automation Investment may not be 100% Aligned

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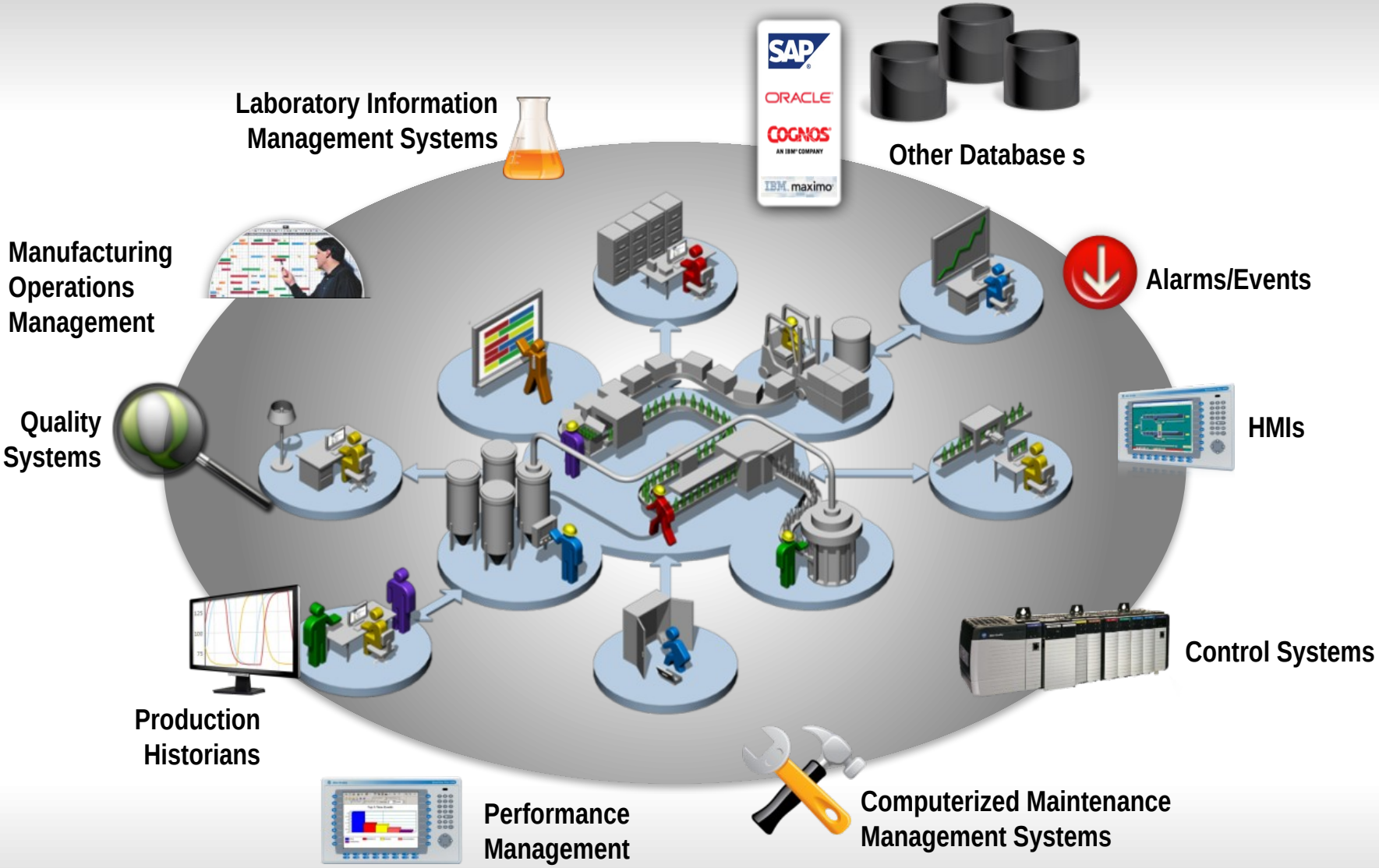

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Building Capability one investment at a time

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ERP

SAP

Oracle Applications

PeopleSoft

Microsoft Dynamics

Manufacturing Operations Management

Integration Gateway
CONSUMER PACKAGED GOODS
Rockwell Software

Production MANAGEMENT
Rockwell Software

Material MANAGEMENT
Rockwell Software

Performance MANAGEMENT
Rockwell Software

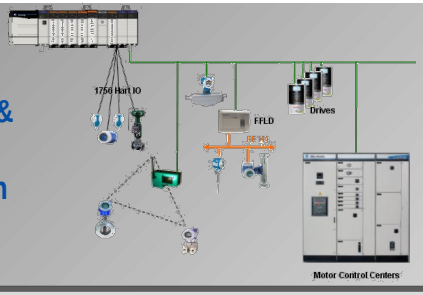
Standard Operating & Procedures

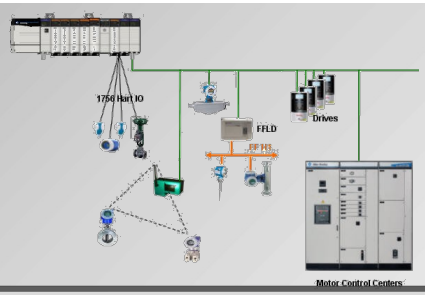
Change & Asset Management

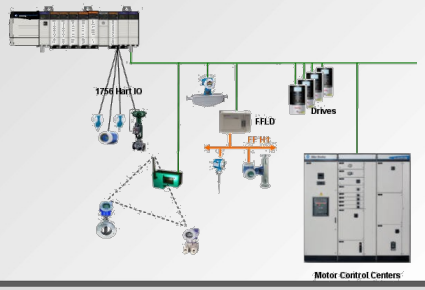
Manufacturing Intelligence

Process Optimisation

Process, Packaging & Safety Automation







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Deliver the correct Information

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Plant Mgmt.

For the Executive

- Costs, schedules, production output
- Financial indicators, sustainability

Production

For the Production Manager

- Schedule, track production activity
- Way production is running, ways to improve

Quality

For the Quality Manager

- How product was made, ensure compliance
- Ways to improve product and yield

Engineering

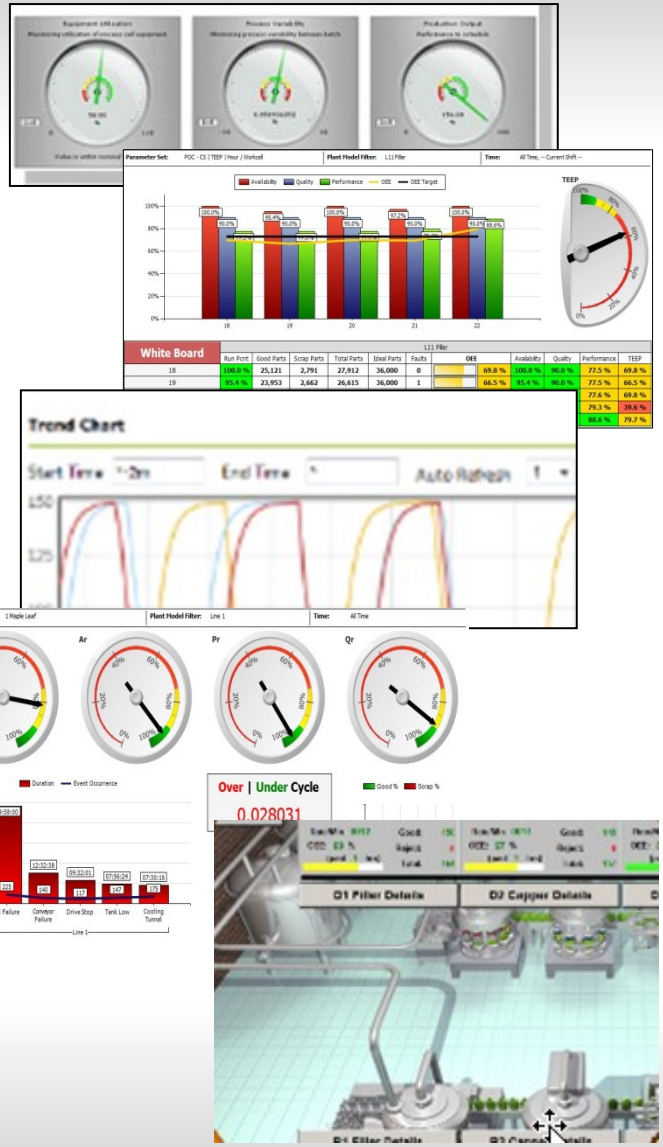
For the Engineering / Maintenance Manager

- Keeping plant running
- Predicative maintenance, asset optimization

Operator

For the Operators

- Monitoring process to keep production running
- Identifying relationships to optimize the process



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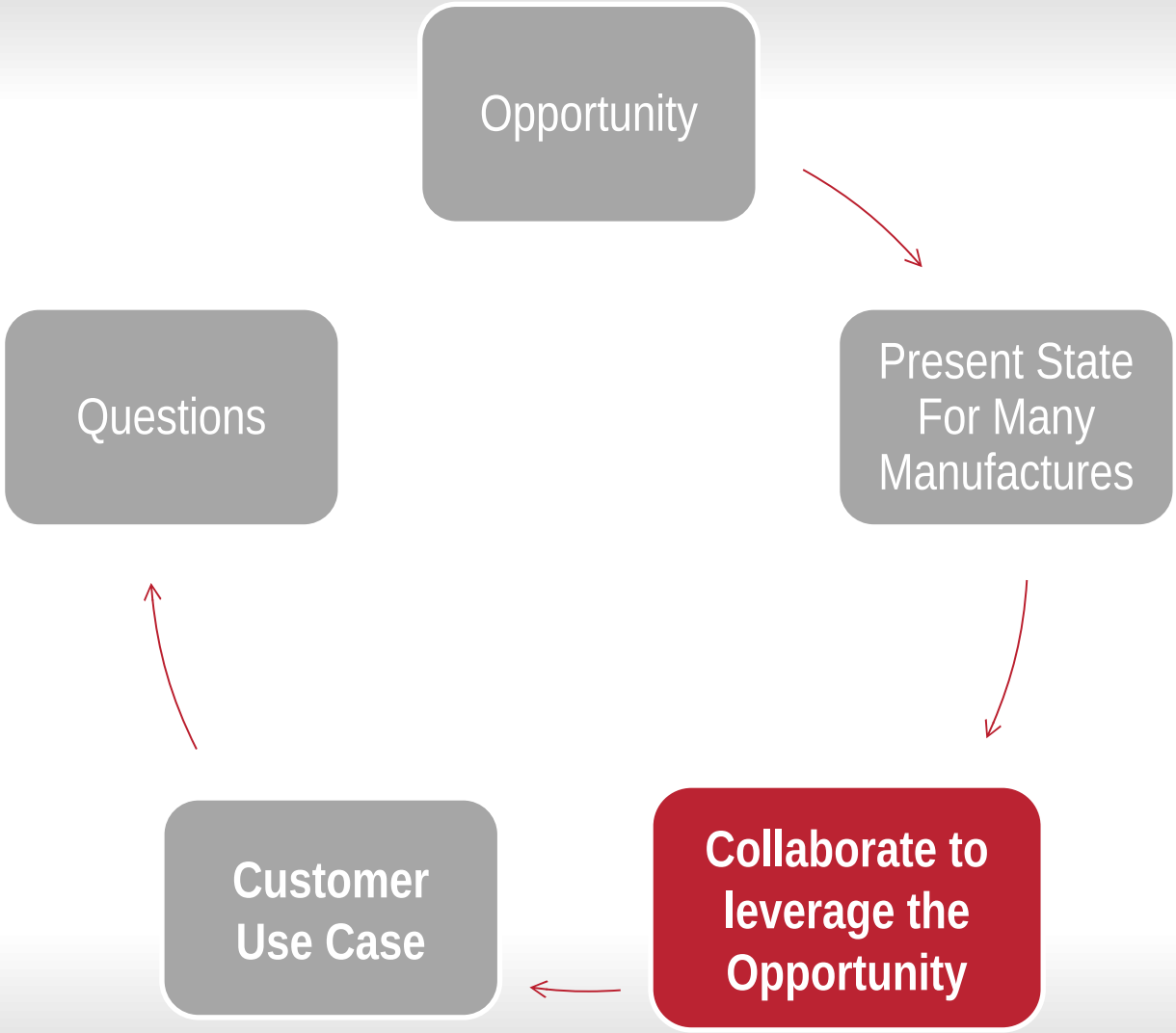

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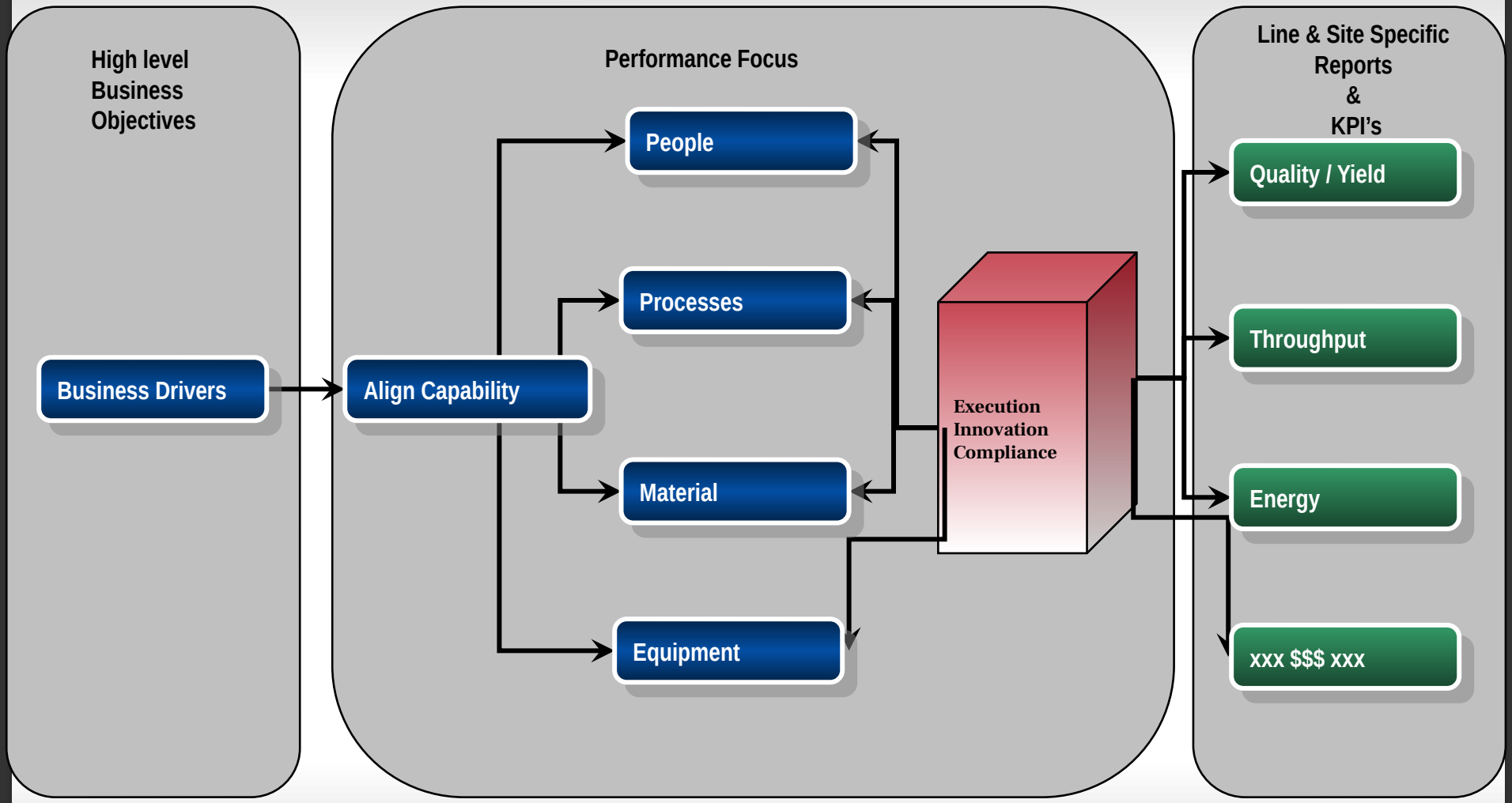
Collaborate to Prioritise Objectives & Align Capability



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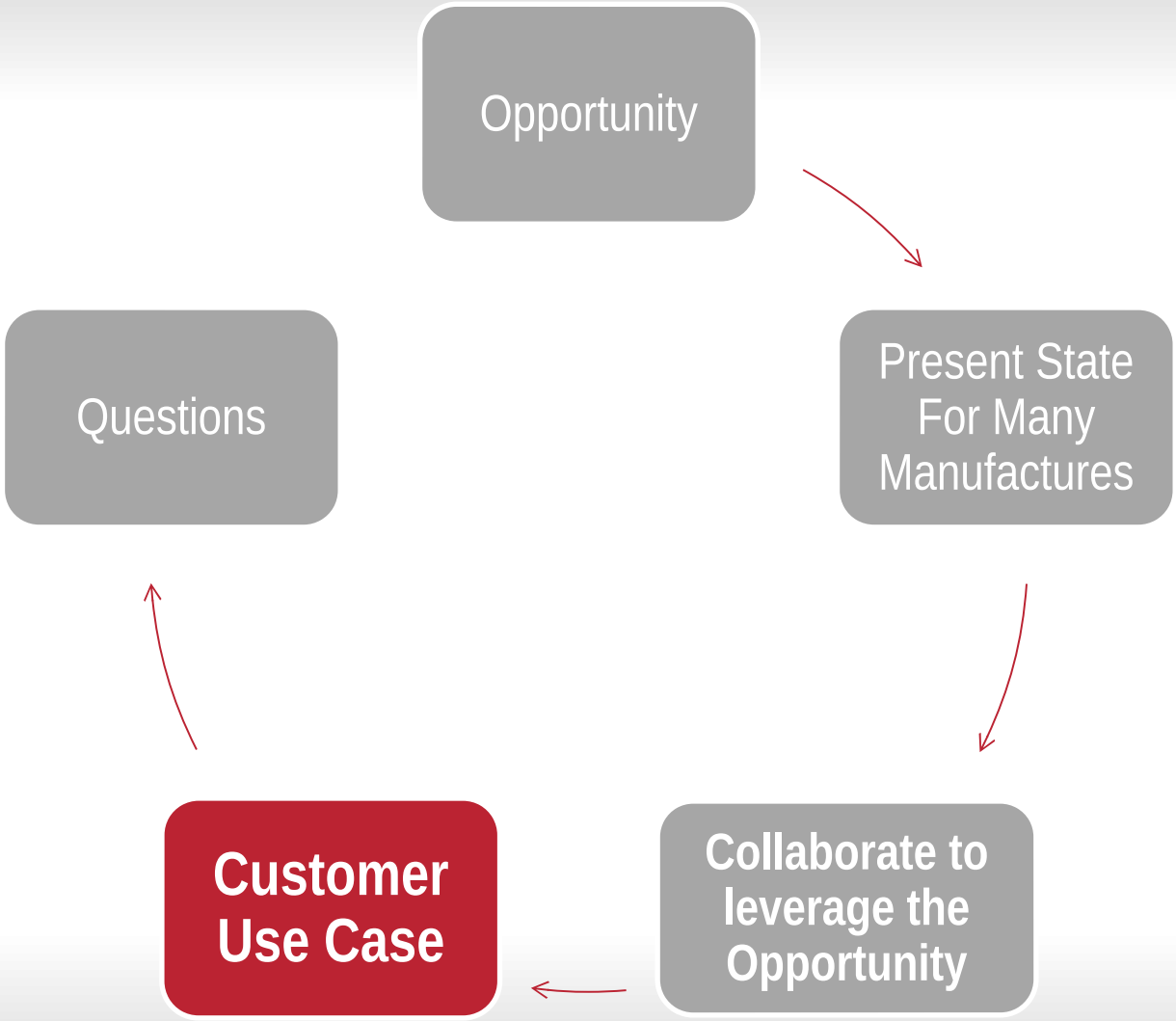

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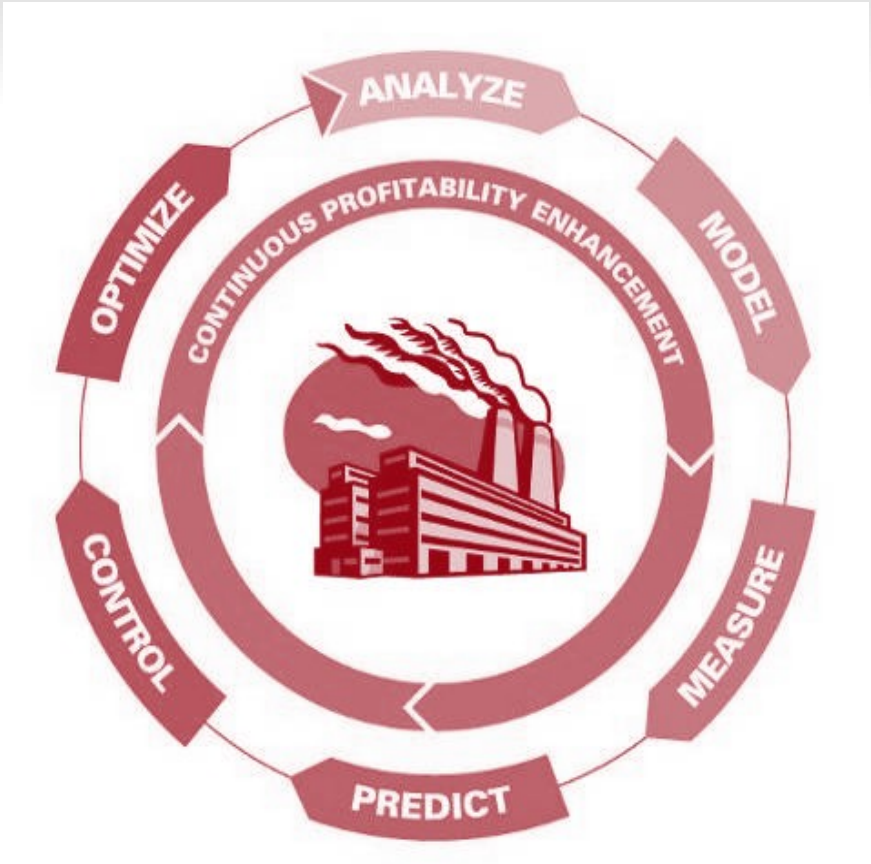
LISTEN. THINK. SOLVE.®

APC & Industry Use - Case

Phillip Terlesk
Sales Executive

Rockwell Improve[illegible] Processes



Enhance Profitability through:

- **Improve Product Quality**
  - Minimize variability
  - Reduce deviation from specifications
- **Increase Production**
  - Unlock capacity Maximize throughput
- **Reduce Manufacturing Costs**
  - Use less energy per unit of output
  - Maximize yield

MPC Goal – High ROI, robust, operator friendly solutions that deliver long-term value

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Model-based Applications Approach

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Analysis

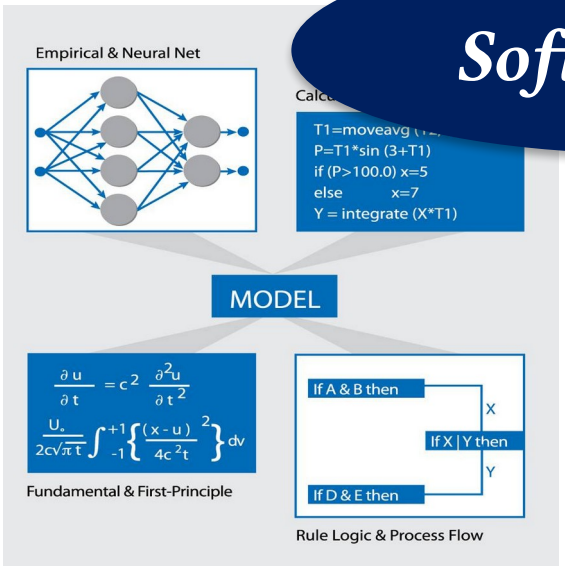
Optimization

Prediction

Control

Soft Sensors

A Hybrid Model explains or emulates the behavior of a process.



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Pavilion8 Model Predictive Control

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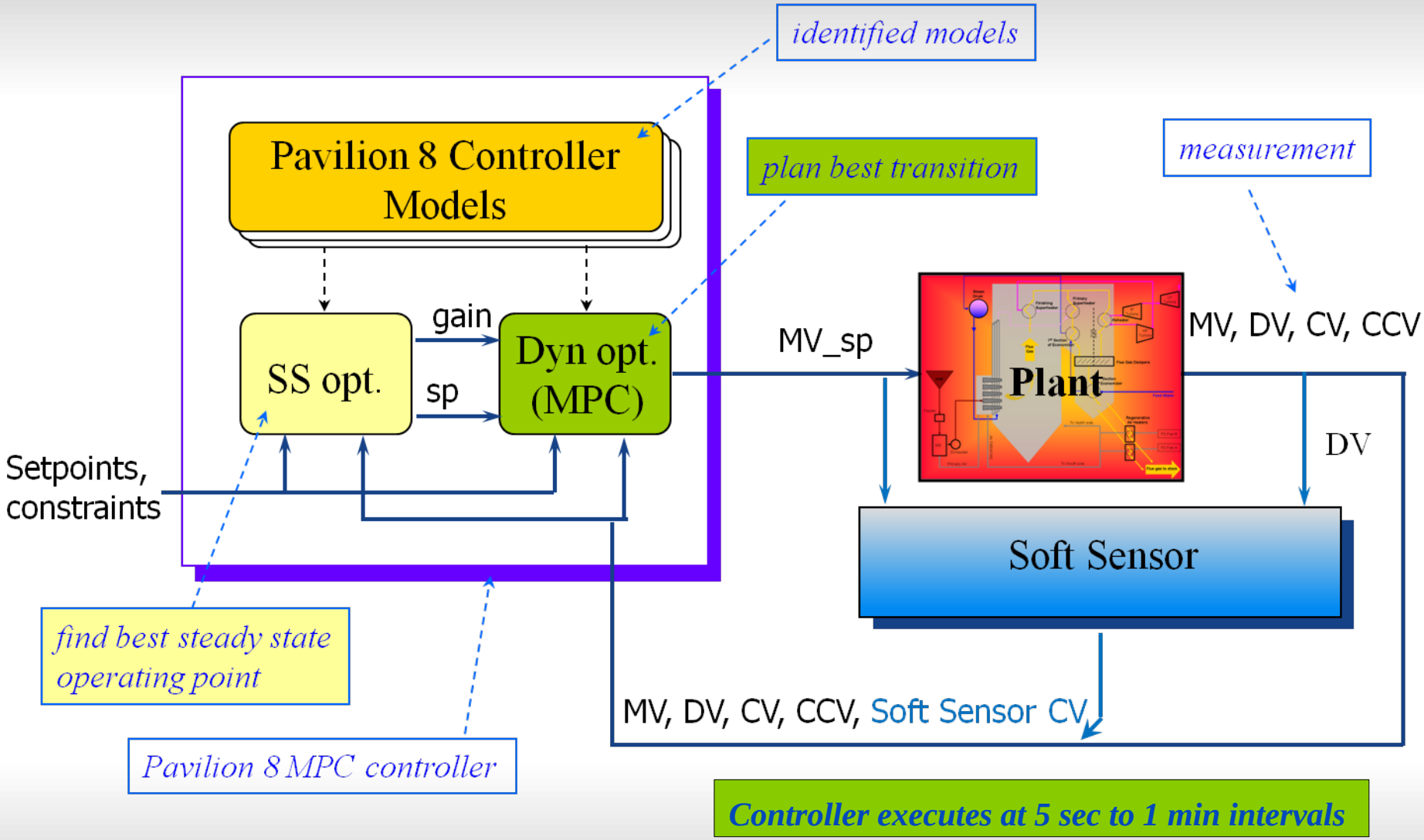

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Soft Sensors (Virtual Online Analyzers or VOA)

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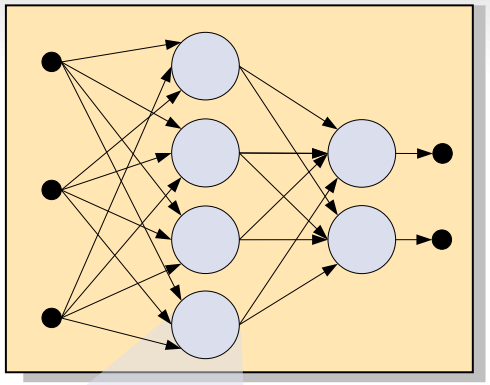
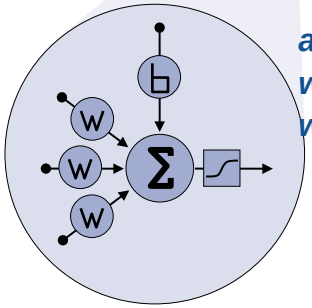
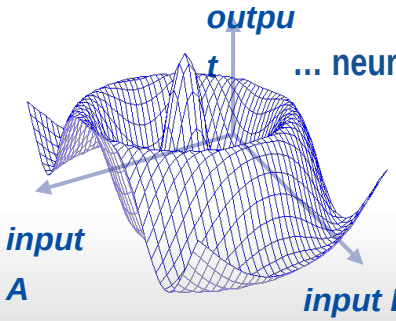
Neural Networks



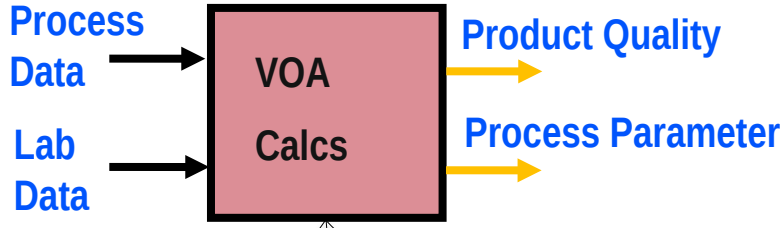


artificial neuron with weight parameters



... neural networks can fit general non-linear relationships

- Replace sparse, or infrequent, feedback from Lab or analyzer



Heat and Material Balances

$$\Delta H_{RXN} = \Delta H_{Ferm} + \Delta H_{Feed} - \Delta H_{Recirc}$$

Traditional Empirical Correlations

$$EtOH = f(\Delta H_{RXN})$$

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How APC Enables Operational Objectives

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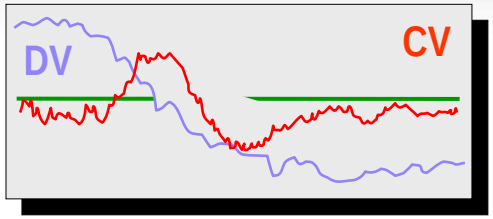
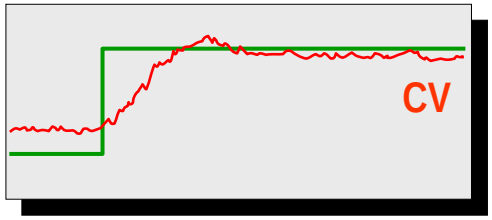
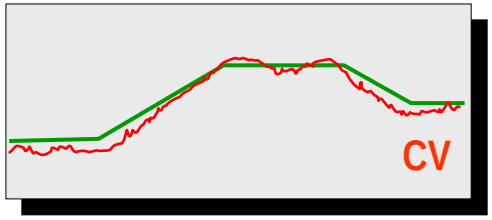
Minimize operational variance



Transition effectively

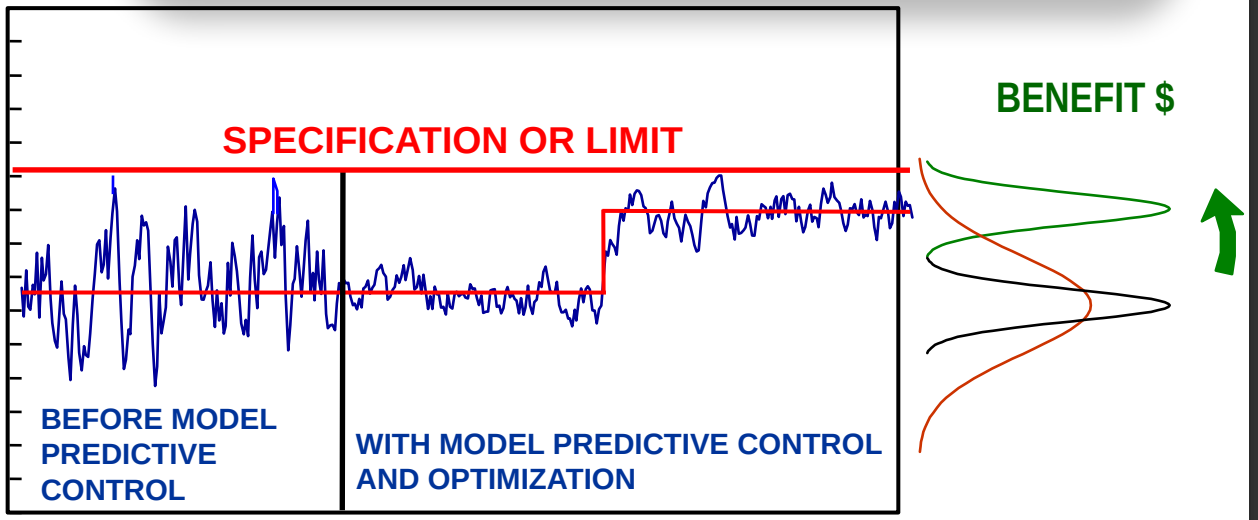


Follow operational plan



Reduce Variability 30 – 50%

Achieves Uplift - closer to spec or performance limit whilst managing the process within constraints and safety margins



The Business Value is Achieved by "raising the bar"

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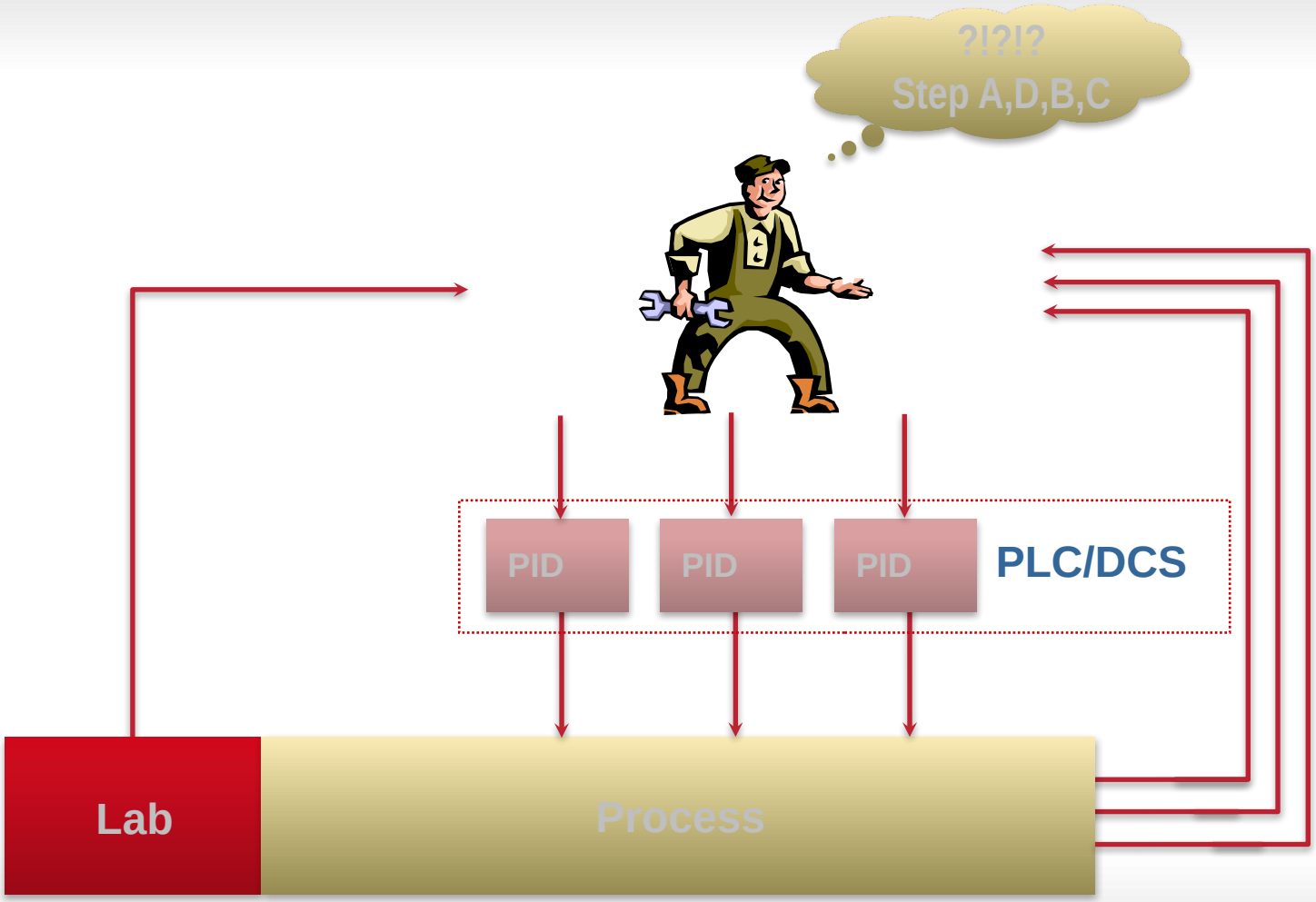
Operator Interaction with a Standard Regulatory Control System



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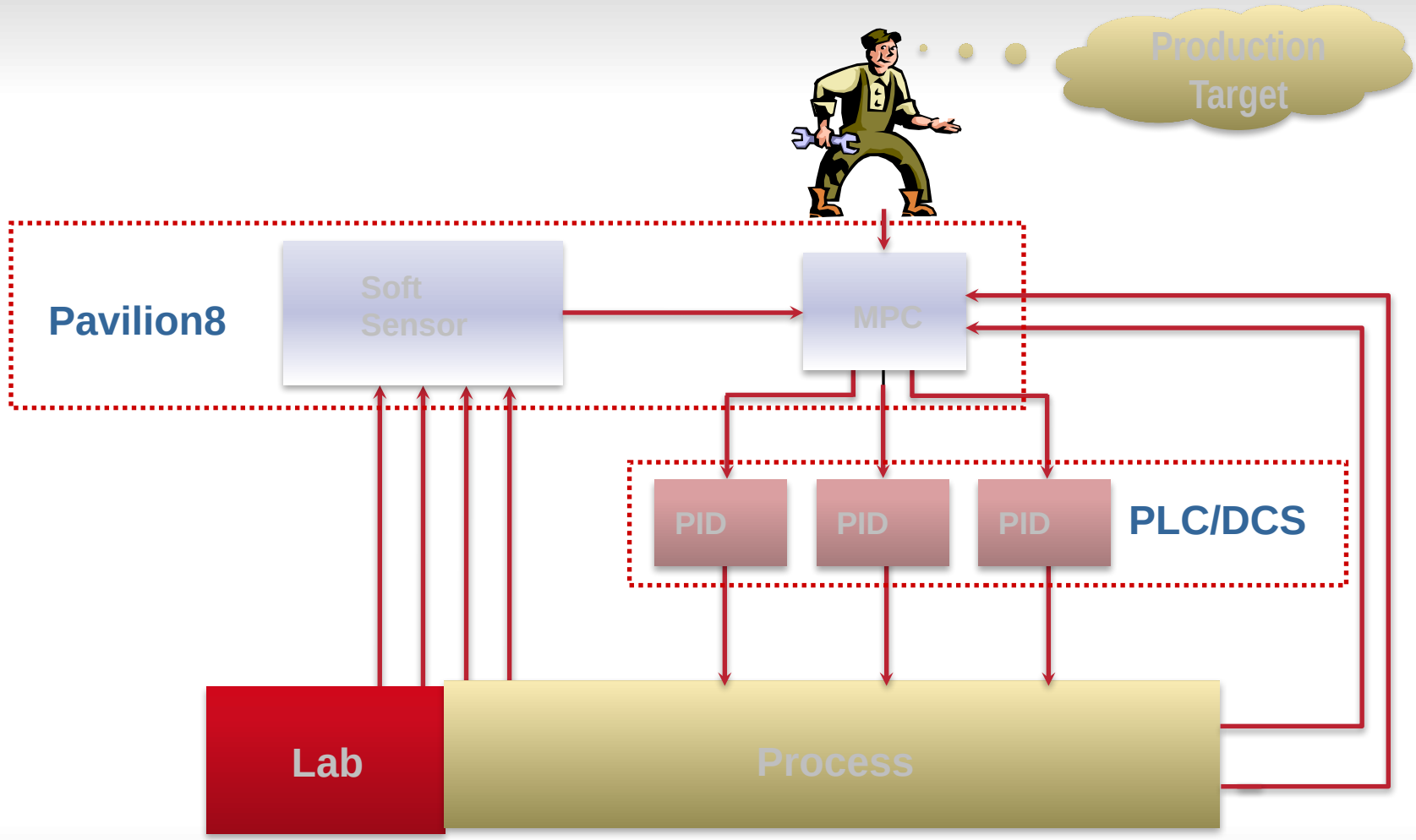
Operator interaction with aModel Predictive Control System



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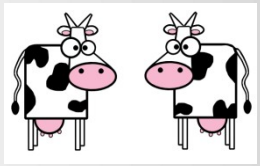
Milk Powder Processing



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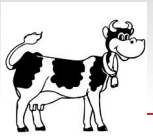
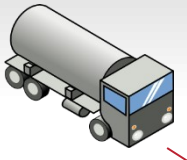
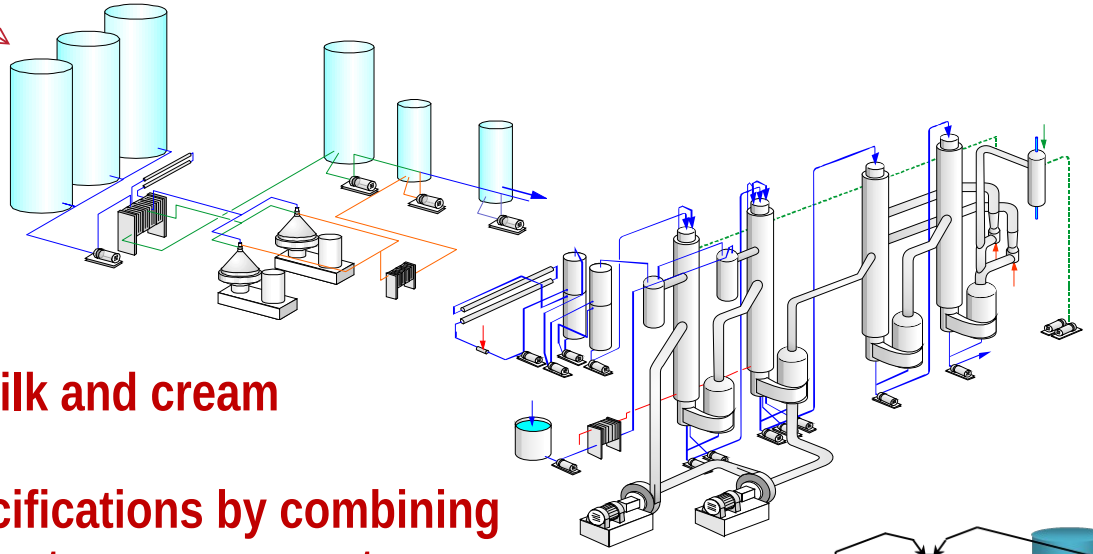
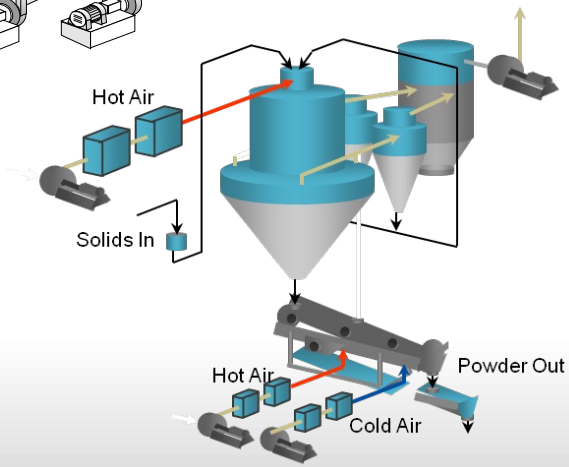






- Farm Cows
- Tankers / Rail
- Raw Milk Silo Storage
- Separation into skim milk and cream
- Standardization to specifications by combining skim milk, cream, and lactose or permeate
- Falling Film Evaporation
- Spray Drying
- Powder Packing



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Dairy Solution

Rockwell Automation

Production Landscape

Quality

Receiving Area & Raw Milk Silos

Milk Separation into Skim Milk & Cream

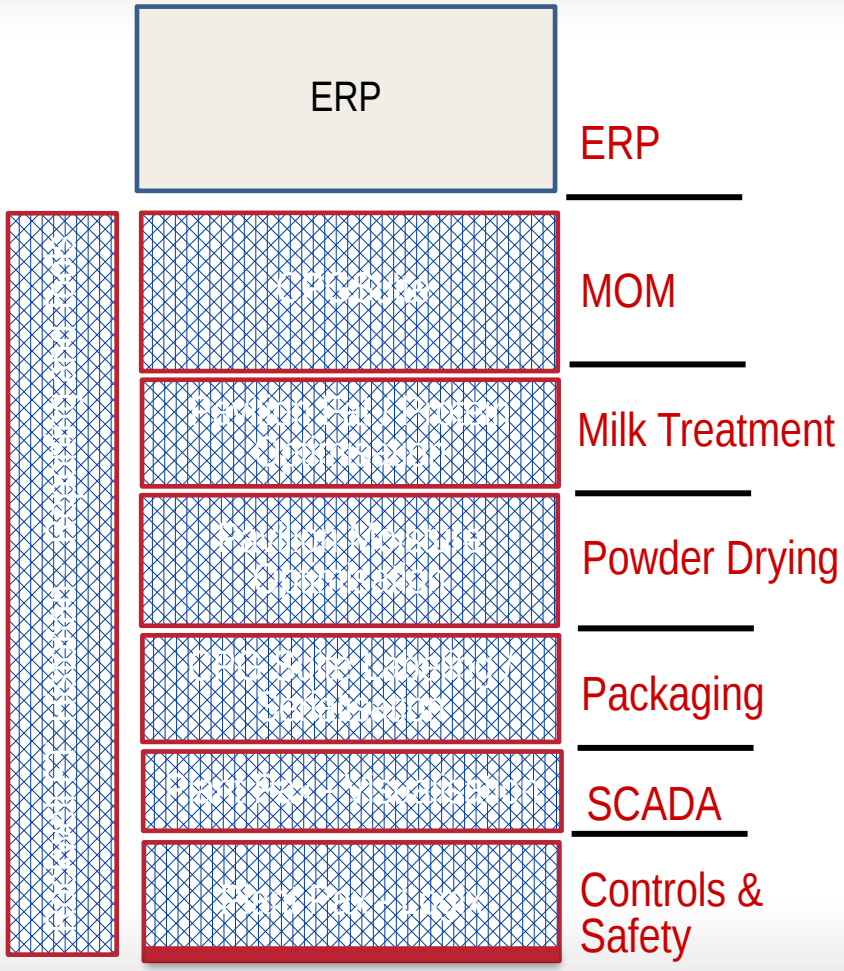
Standardization to specifications by combining skim milk, cream, and lactose or permeate / Milk Treatment

Evaporation / Drying / Fluidbed

Packaging /Logistics/Mass Serialisation

Utilities

Future Automation Landscape



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Scope for both Protein & Fat Optimisation & Pavilion8 Dryer & Evap MPC

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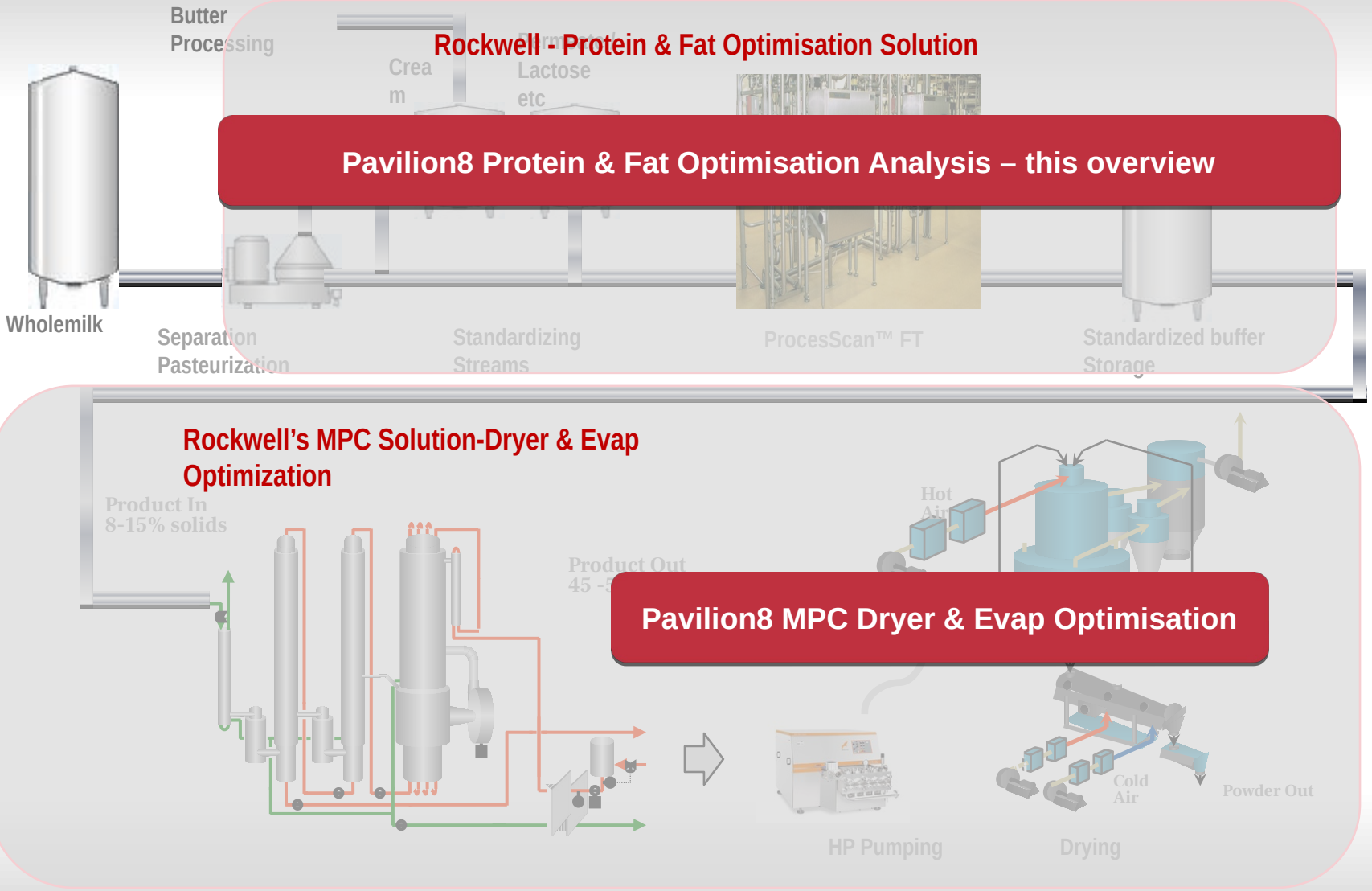

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Dairy Standardisation Solution

Rockwell Automation

- **Rockwell's Pavilion8 Model Predictive Control (MPC) platform provides a closed loop standardising solution with superior targeting of final powder Fat and Protein composition.**

- **Minimising giveaway of protein and fat in the standardisation process optimises yield providing substantial financial benefit.**

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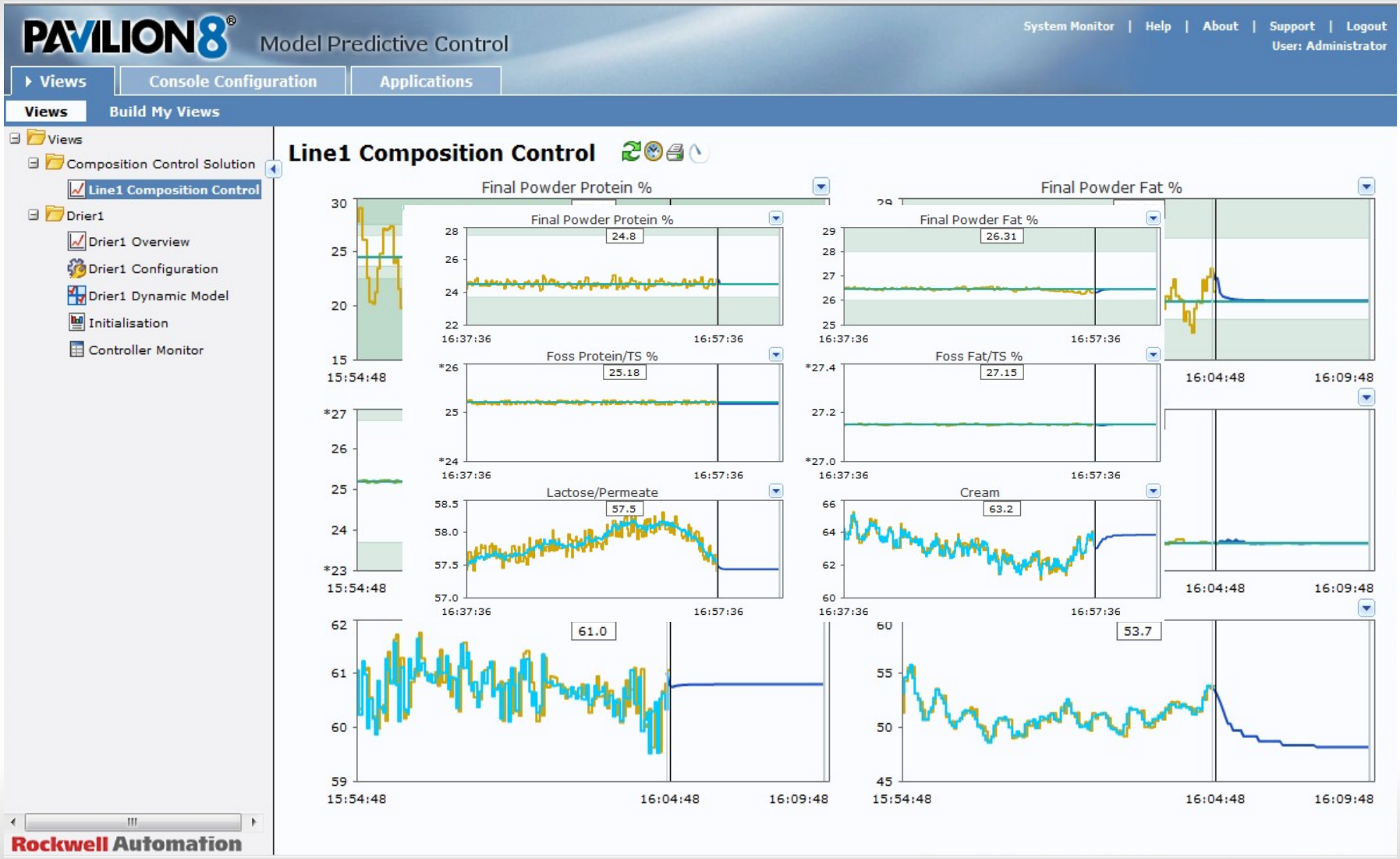
Dairy Standardisation Solution Performance and Visability



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Visualisation: Performance Metrics

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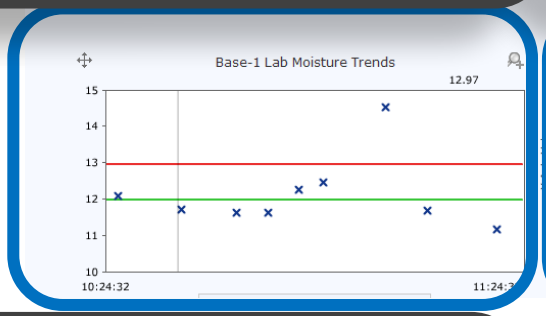
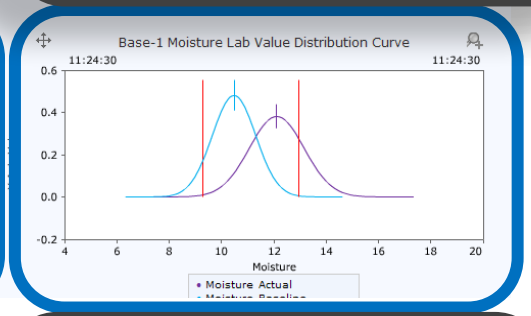
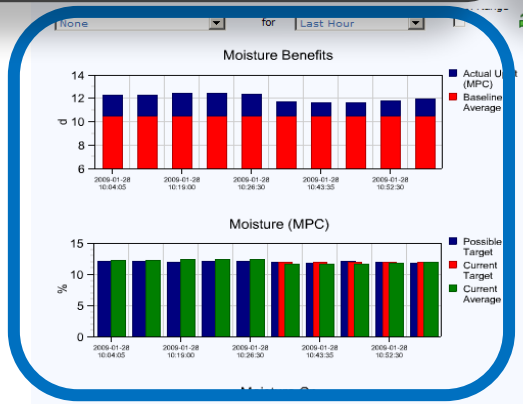
Accepted moisture lab value against specification limit and controller target



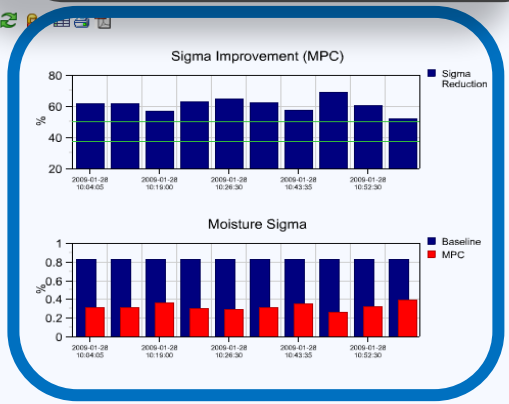
Distribution curve comparison (mean & standard deviation) against baseline



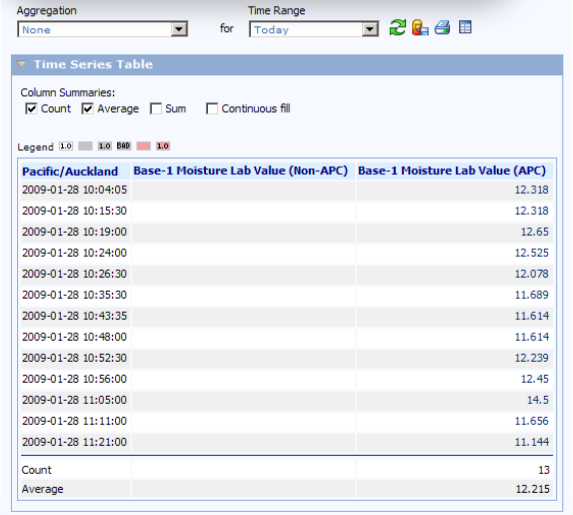
Moisture benefits, control performance & how hard moisture is pushed



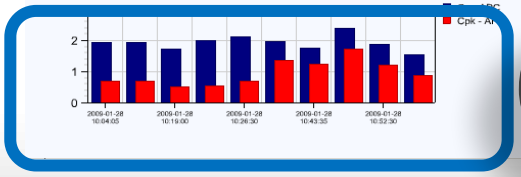
Standard deviation improvement against baseline



Downloadable & accepted moisture lab values report



Pacific/Auckland	Base-1 Moisture Lab Value (Non-APC)	Base-1 Moisture Lab Value (APC)
2009-01-28 10:04:05		12.318
2009-01-28 10:15:30		12.318
2009-01-28 10:19:00		12.65
2009-01-28 10:24:00		12.525
2009-01-28 10:26:30		12.078
2009-01-28 10:35:30		11.689
2009-01-28 10:43:35		11.614
2009-01-28 10:48:00		11.614
2009-01-28 10:52:30		12.239
2009-01-28 10:56:00		12.45
2009-01-28 11:05:00		14.5
2009-01-28 11:11:00		11.656
2009-01-28 11:21:00		11.144
Count		13
Average		12.215



Cp – how good is distribution within limits: Cpk – how centre is the distribution within limits

A key Differentiator

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Dairy Standardisation Solution Benefits

Rockwell Automation

- **Composition variability reduction of 50% or greater**
- **Tight compositional control allows fat and protein targets to be driven to the specification minimums.**
- **Superior final powder compositional targeting.**
- **Performance visualisation facilitates proactive decisions**

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