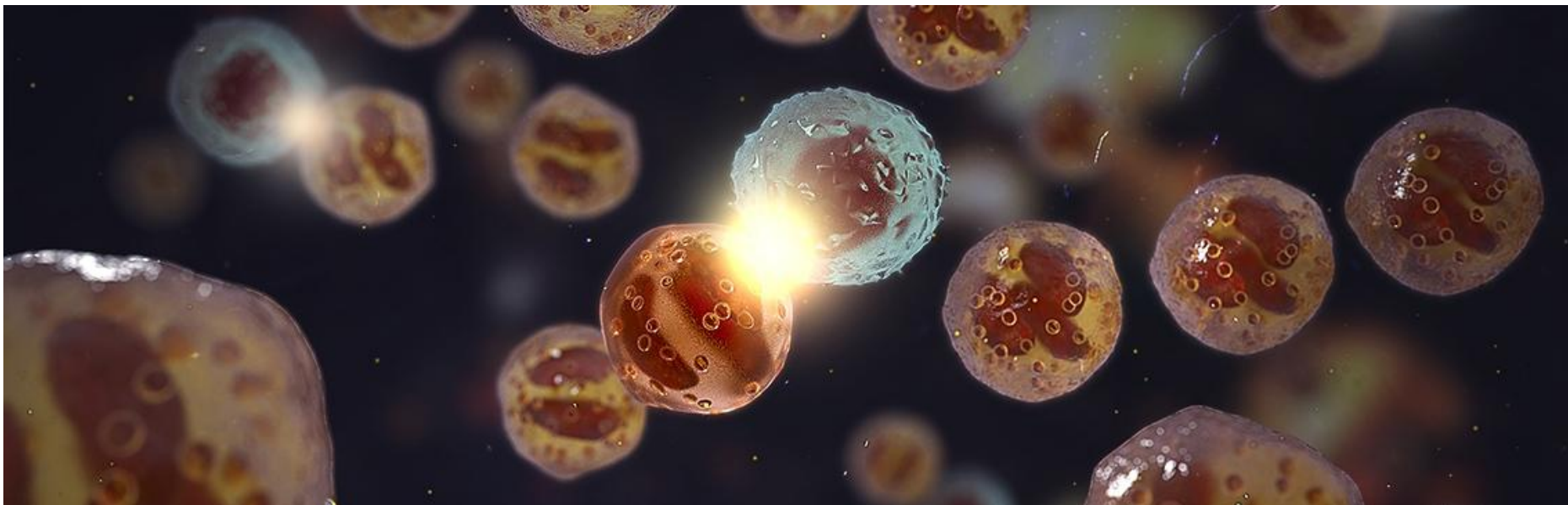


Hvordan AstraZeneca jobber med Lean i et innovativt miljø og deres Leanreise

How AstraZeneca works with Lean in an innovative environment and their Lean journey

Bryan Egner, R&D Supply Chain, AstraZeneca Gothenburg, Sweden
Innovasjon og Omstilling Lean Forum Norges Årskonferanse

10 November 2015



Reflections on the subject of Lean and Continuous Improvement at AstraZeneca Gothenburg from:

(1) A Research Chemist

(2) A Lean Sigma **Yellow/Green/Black** Belt

(3) An R&D Supply Chain Project Leader

AstraZeneca in One Slide

To be a **global biopharmaceutical business delivering great medicines to patients through innovative science** and excellence in development and commercialisation



Oncology



Cardiovascular / Metabolic Diseases



Respiratory / Inflammation / Autoimmunity



Infection / Vaccines



Neuroscience

- We are **57 000** employees around the world

**Crestor, Nexium, Brilinta, Symbicort, Seroquel, Zoladex,
Synagis, Atacand, Seloken/Toprol, Pulmicort**



AstraZeneca Gothenburg, Sweden



My Lean Journey in an Innovative Environment

- Autumn 2006

**RESEARCH SCIENTIST ENTERS THE LEAD
OPTIMISATION TASKFORCE**

- Spring 2007

YELLOW BELT CAPTURES FIRST DATA POINTS

- Autumn 2010

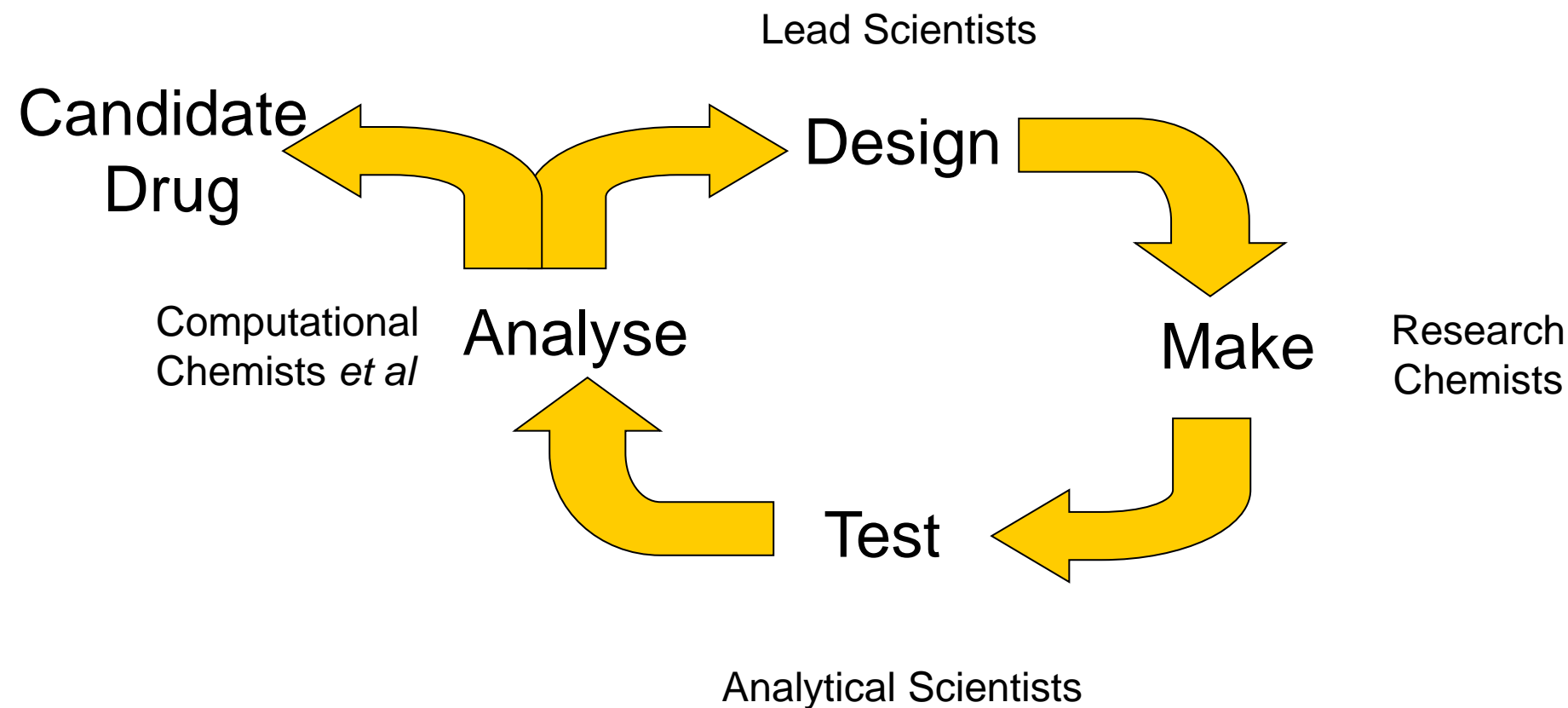
GREEN BELT FACILITATES LASTING CHANGE

- Spring 2014

**BLACK BELT LEAVES SCIENTIFIC DISCOVERY FOR
OPERATIONAL EXCELLENCE**



The Lead Optimisation Taskforce



What is the cycle time?



Yellow Belt Course

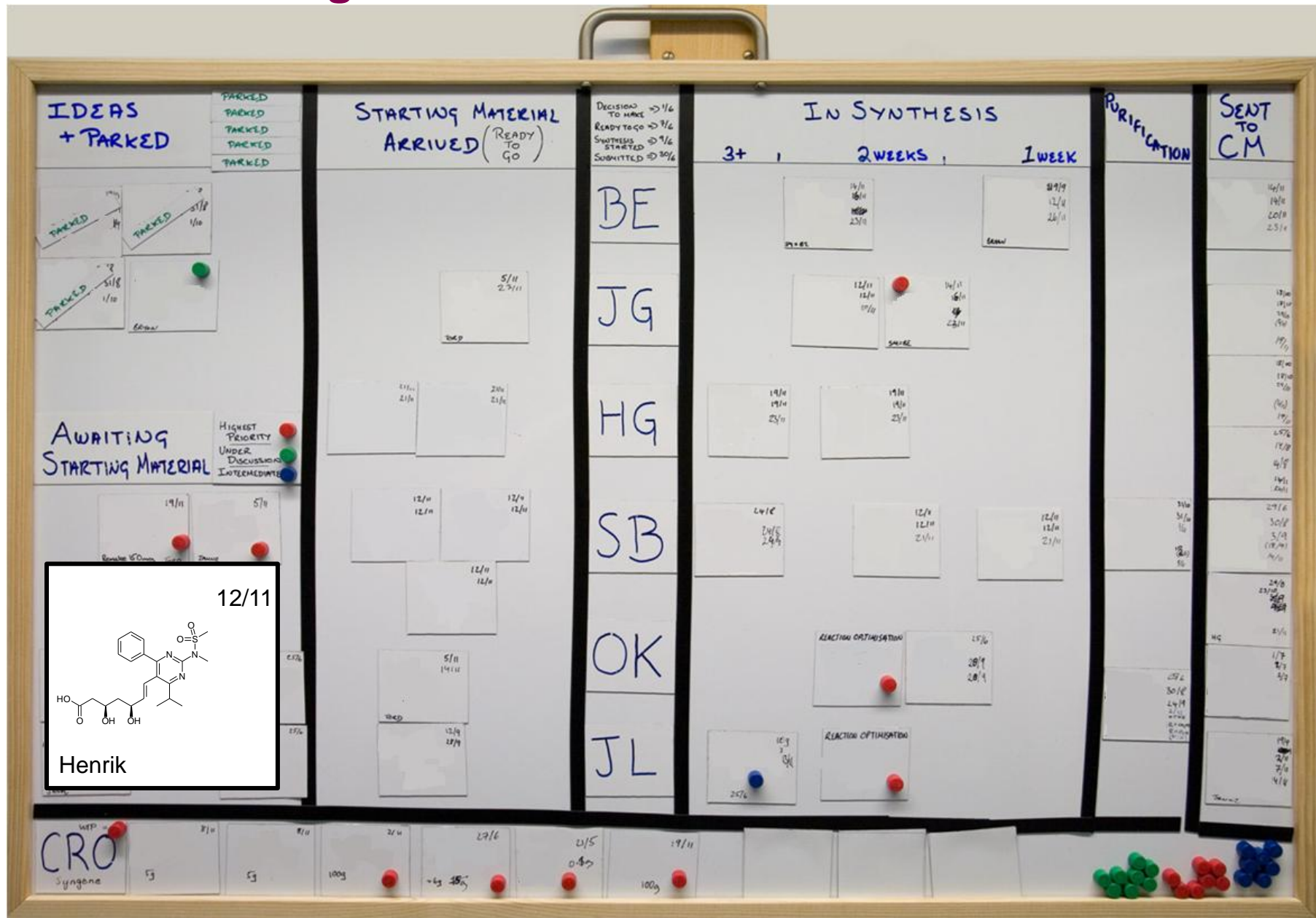
- 3 Day Lean Sigma Awareness
- Day 1: Take away message: **The Benefits of Visual Planning**
- Day 2 Morning: Take away message: **The Importance of Data**
- Day 2 Afternoon: Sketched a **Visual Planning** tool to aid **Data Capture**
- Day 3: ?



Visual Planning in a Research Laboratory



Visual Planning (Compound structures removed due to confidentiality)



Data Capture – How long does it take to synthesise a compound?

Decision to Make -> Submission

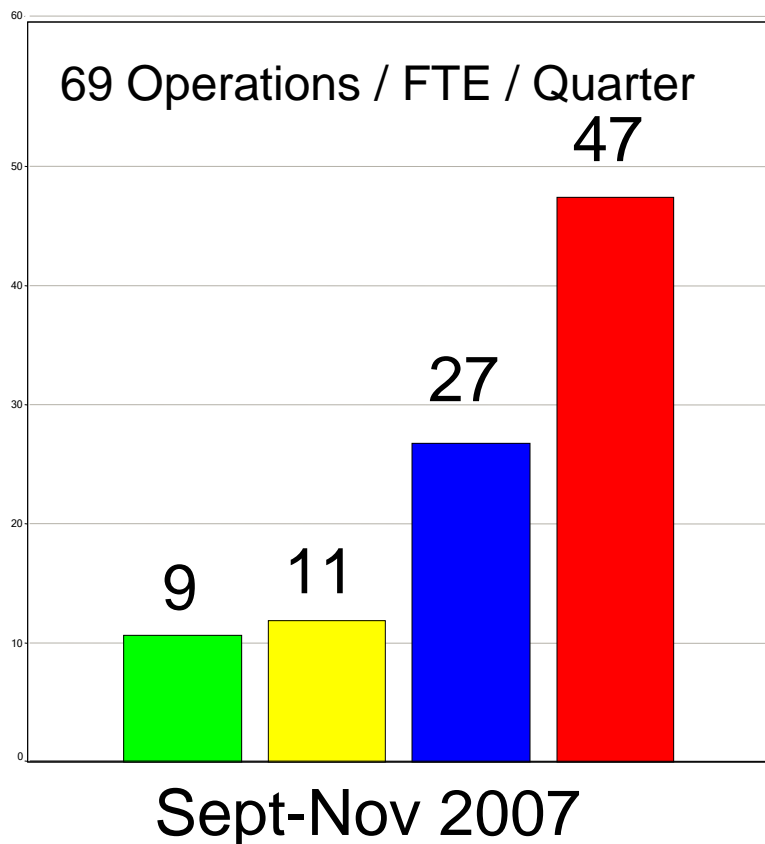
Start of Synthesis -> Submission

Starting Materials Arrived -> Start of Synthesis

Decision to Make -> Starting Materials Arrived

Measured in Mean Working Days

(i.e. excluding weekends and public holidays)



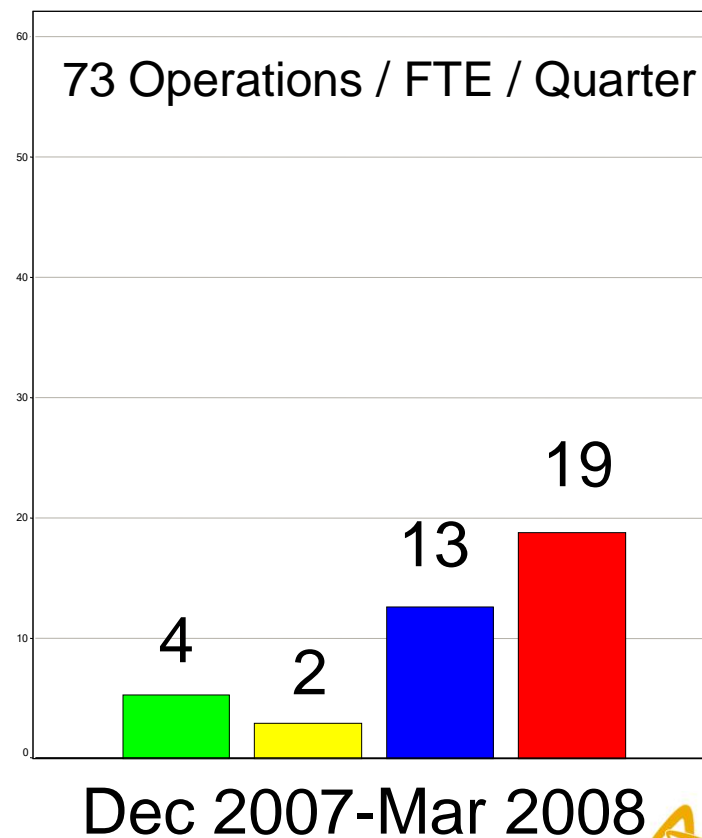
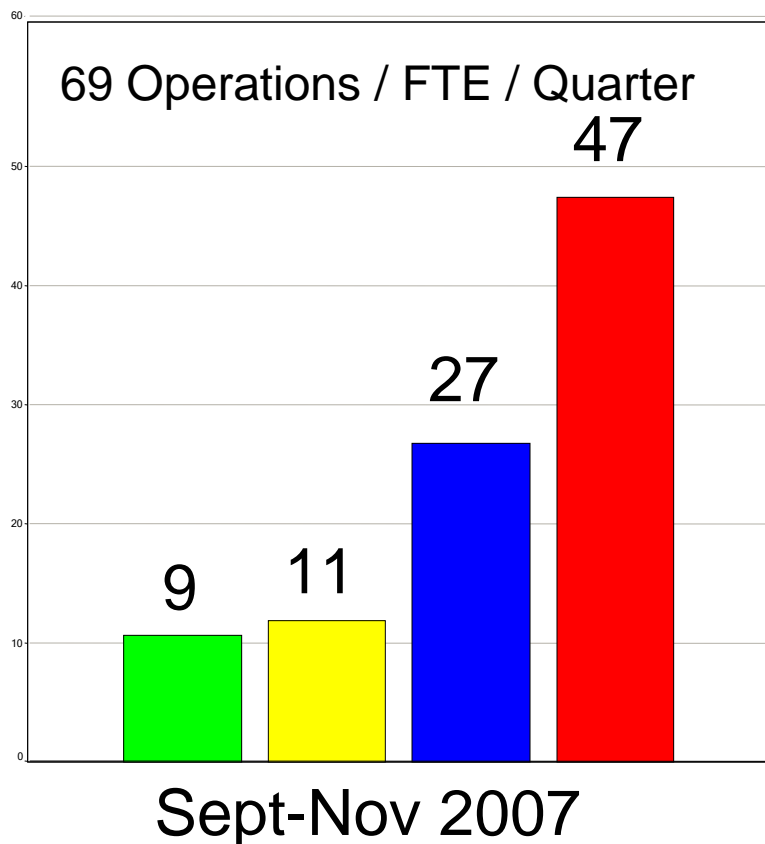
Visual Planning (Compound Structures removed due to confidentiality)



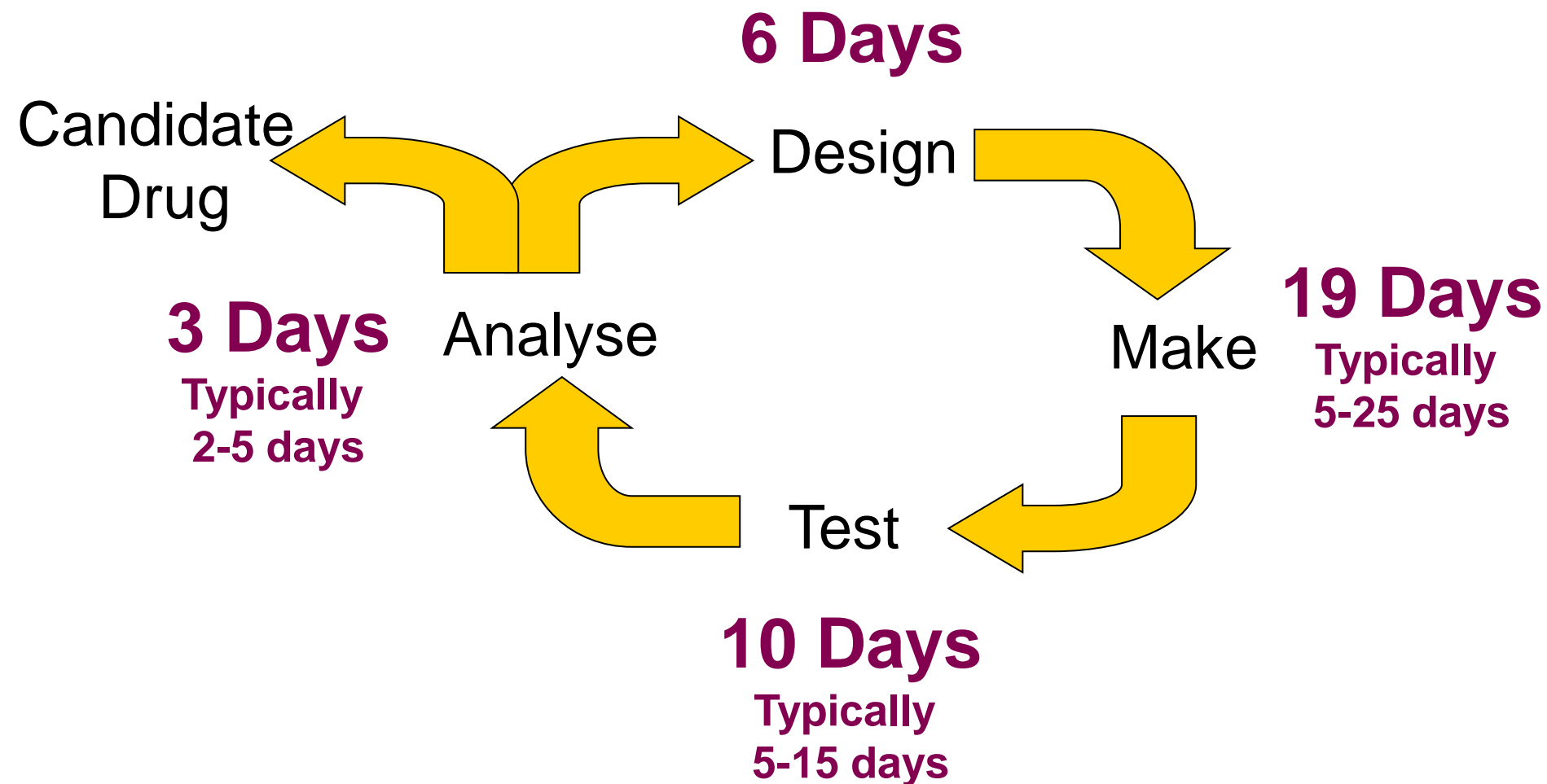
Reducing Work in Progress

- Decision to Make -> Submission
- Start of Synthesis -> Submission
- Starting Materials Arrived -> Start of Synthesis
- Decision to Make -> Starting Materials Arrived

Measured in Mean Working Days
(i.e. excluding weekends and public holidays)



What is the cycle time?



- Chemists feel they are “always making important compounds”



Lead Optimisation Taskforce - Reflections

- **Visual Planning, Data Capture** and the introduction of a **Defined Design Team** brought greater focus to our core business improving speed and quality.
 - A model that still lives 8 years later
- Brought greater team work, collective responsibility & shared understanding

Further Reading

- Making medicinal chemistry more effective – application of Lean Sigma to improve processes, speed and quality.
Shalini Andersson *et al*, Drug Discovery Today.
Volume 14, No 11/12, June 2009, 598-604



Unifying Lean Improvement and Innovation - Reflections

- Deploying Lean Thinking reduces costs and improves productivity
- Deploying Lean Thinking alone does not drive innovation ...
- Continuous Improvement + Motivation & Engagement = Innovation
(Reduced Frustration) (Increased Understanding)

Further Reading

- Creativity, innovation and lean sigma: a controversial combination?
Craig Johnstone, Garry Pairaudeau and Jonas A. Pettersson
Drug Discovery Today. Volume 16, No 1/2, June 2011, 50-57



The Green Belt Project

- Task:
 - Take a highly pressured and stressed analytical chemistry team on a Lean Sigma journey.
- Problem statement:
 - The team is at full capacity and running without significant back-up in specialist areas.
Absenteeism and any increased workload will lengthen lead times



Define & Measure

- ✓ Charter
- ✓ In/Out of Scope
- ✓ Time Spent
- ✓ SIPOC (Supplier, Input, Process, Output, Customer)
- ✓ Value Stream Map (VSM)
- ✓ Voice of the Customer (VOC)



Analyse

- Customers extremely happy 😊😊😊
- Lead Time data excellent 😊😊😊
- A service above and beyond all expectations!
- But what about the team itself?
- Mission Statement:

By expert knowledge and excellent equipment any analytical problem can be solved in a timely manner
The NMR Team should demonstrate a climate of:

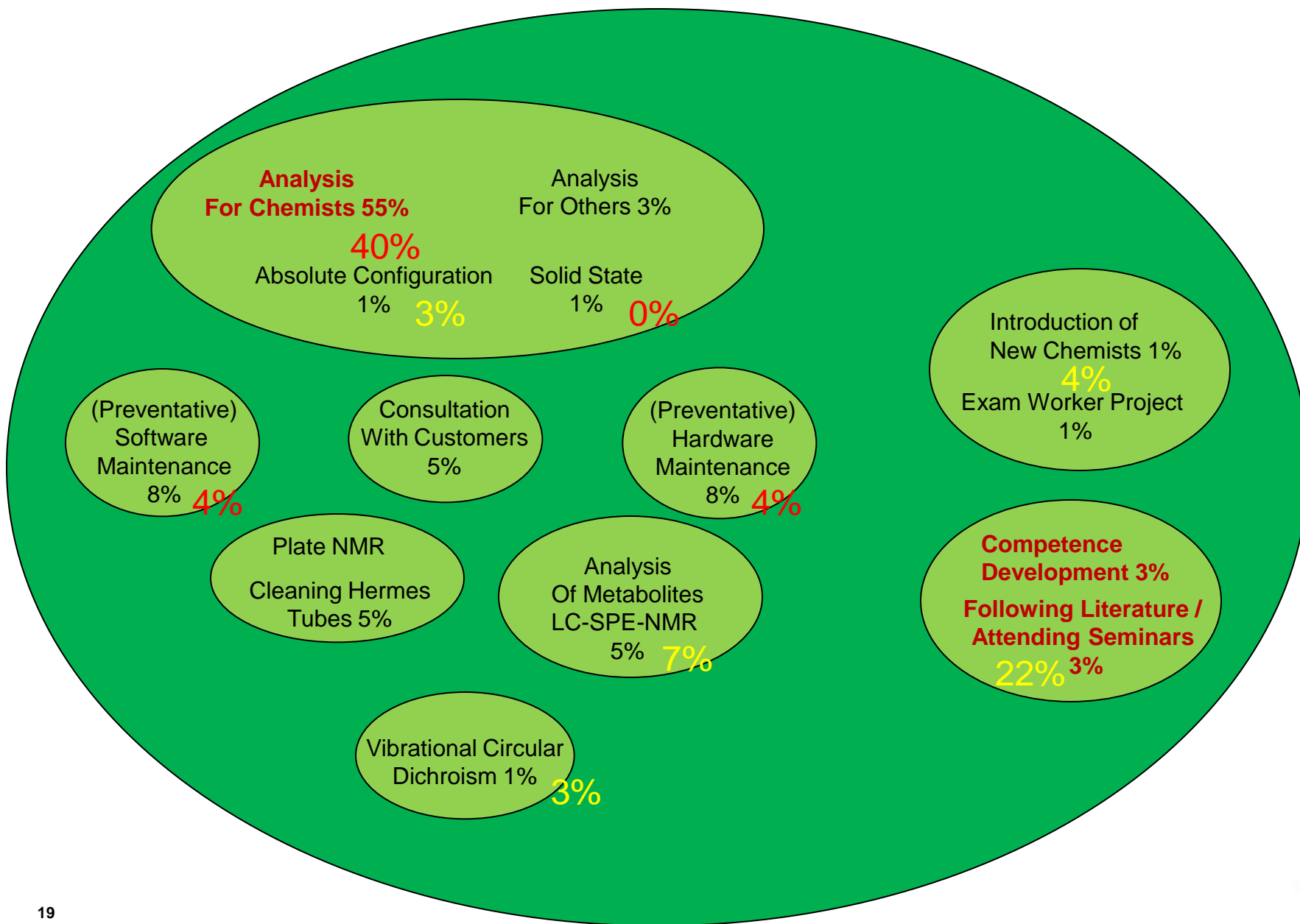
Efficiency,	6,7,6,6,5	= 6
Scientific Excellence,	7,5,6,7,6	= 6
Energy and Enthusiasm,	8,9,9,7,6	= 8
With Team Spirit.	9,10,10,9,9	= 9

- A Modified Problem Statement:

The nmr team is at full capacity serving their customers. **The Team is unable to develop in line with their potential and vision.** They are running without significant back-up in specialist areas and any absenteeism or increased workload will lengthen lead times and reduce quality to *their currently satisfied customers*



In Scope, Time Spent & Future State Map



Revisiting the VSM

Target = 85% within 2 working days

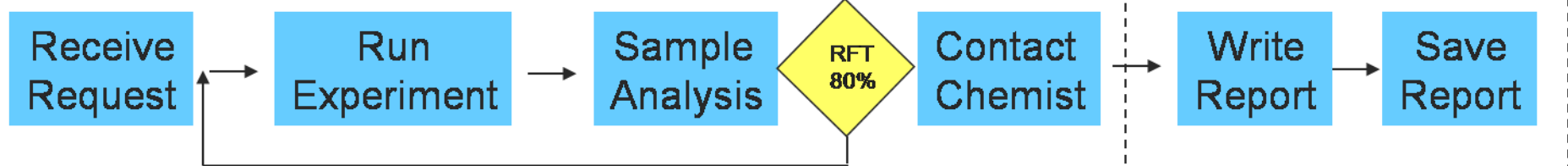
Target = 95% within 5 working days

Working Day = 8 hours

For Right First Time
 Cycle Time = 9h
 Delay Time = 6.5h
 Value Stream Lead Time = 15.5h
 Value Added Time = 5.5h

Cycle Time Ratio = 58%
 Value Stream Ratio = 35%

Chemist



CT = 15 min
 Range = 0-30 min
 VAT = 0 min

CT = 30 min *
 Range = 20-60 min
 VAT = 30 min

CT = 8 hours
 Range = 30 min-2 days
 VAT = 4 hours

CT = 10 min
 Range = 0-1h
 VAT = 10 min

CT = 1 hour
 Range = 0.5-2h
 VAT = 1 hour

CT =

Amount of Substance
 15N Separate machine requires re-routing
 Rotamers require temp changes

Too much WIP
 Not working 100%
 Disturbances
 Breaks
 Difficulty of the problem
 Hand-overs

Sample Difficulty
 Level of Requester Interest

What is value to the customer / NMR Team

WT = 4 hours
 Range = 10 min – 2 days

WT = 2 hours
 Range = 0 - 1 day

WT = 30 minutes
 Range = 0-1 hour

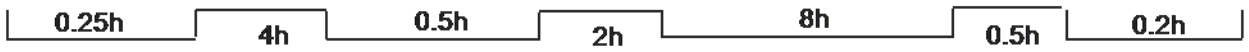
WT = 3 hour
 Range = 0-5 days

Too High Demand for Instrumentation
 Other Activities
 Difference between NMR scientist

Too much WIP
 Low priority sample

Mode of Communication
 Other things to do

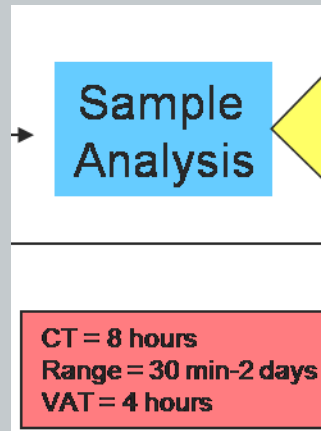
Registration of Compound by Chemist



* Assuming samples are run overnight

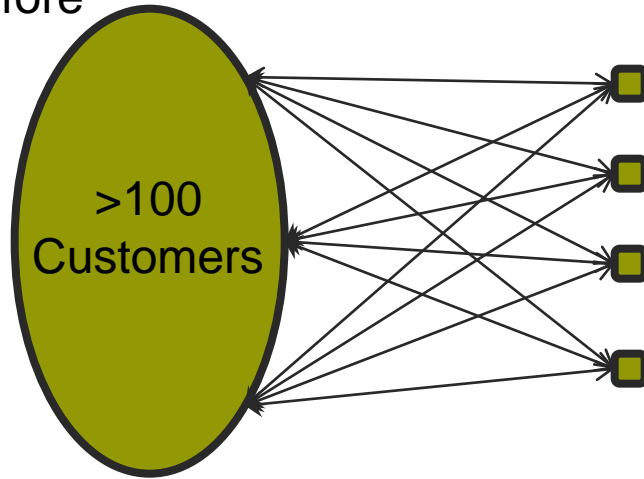


Revisiting the VSM

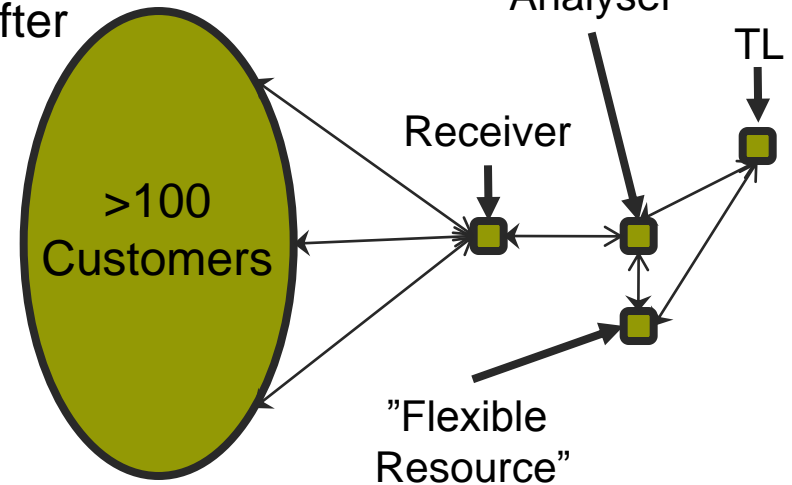


Improvement

Before



After



- Stressed
- Real risk for increased lead time due to absenteeism
- One speciality, one scientist
- Everyone is equal all of the time
- Group

- "Stressed" 1 week of 3
- Defined rotational roles, Team Leader role lifted
- No increase in lead time was observed
- Team



Comments and Reflections

- Visual Planning tools essential for implementation:
 - Work in Progress and a Development Calendar
- The working model is still in place today 6 years later
- Piloted early – with clear communication to the customers

- Personally: The importance of engagement, facilitation and coaching



Towards a Black Belt 2011-2013 @ 20% FTE

- Developed as a Team Building Lead – The Second Best Quizmaster in Gothenburg
- Became a Facilitator
- Became an Appreciative Inquiry Lead
- Became a Practitioner Coach
- Led cross functional improvements
 - Process Mapping
 - Capacity Determination
 - Creating Flow
 - Change Management

2014: Black Belt Accreditation & Arrival in the R&D Supply Chain



Reflection:

Improvement success happens when ...

- There is engagement and willingness to change + visible sponsorship
- The problem, project and expectations clearly defined (Charter)
- The focus is on the problem and not the tools
- Decisions are data driven
- The customer and the team are understood
- The project team creatively keeps to the delivery plan
- The project finds the simple solutions and pilots early



Favourite Lean Tools of Mine

- Scoping + Time Spent Tool + Future State Map
- SIPOC – An engaging icebreaker and mapping tool
- Value Stream Map and data collection
- Visual Planning + VP Standing Meetings

- 5S + Visual signalling
- Kaizen Events
 - The Atlassian Shiplt Day (a.k.a. FedEx Day)

- 3+1 VOC Questionnaire

- The Quicky Root Cause Analysis Tool (A simplified A3/8D)

- Think Simple, Think Different Mindset



The 3+1 VOC Questionnaire

Effectiveness is in its simplicity

- Short description to set the scope the questionnaire

Q1-> In your experience how could the team improve delivery?

Q2-> In your experience what does the team deliver well?

Q3-> In your opinion what should we do about ... ?

Q +1 -> What question should we have asked? And what would your answer have been?

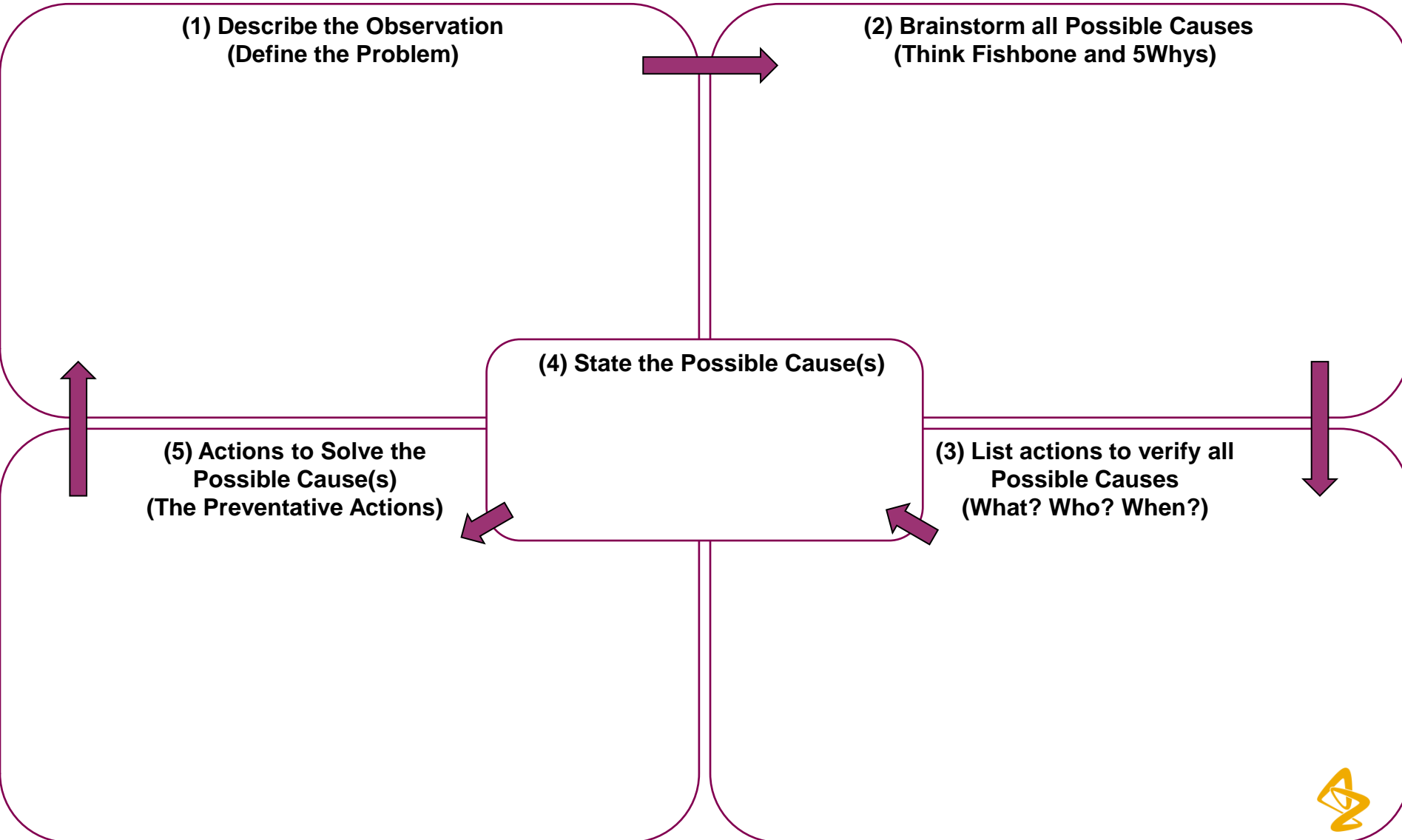
- Celebrate!



The Quicky: A Root Cause Analysis Tool for Unplanned Deviations and Problem Solving

3-5 persons
Print out on A3

*Machine? Method?
Material? Measurement?
Manpower? Environment?*



The Quicky:

Tips and Tricks

Print out on 2 separate A3 sheets

"A problem well stated is a problem half-solved"

Reserve 1 hour to:

- (1) Define the problem
 - (2) Brainstorm possible root causes
 - (3) Formulate actions to verify prioritised root causes
- Return in 1 week with all the data and take <1 hour to
- (4) List actions to solve the possible causes

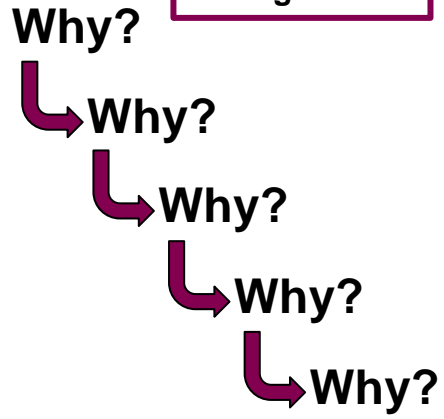
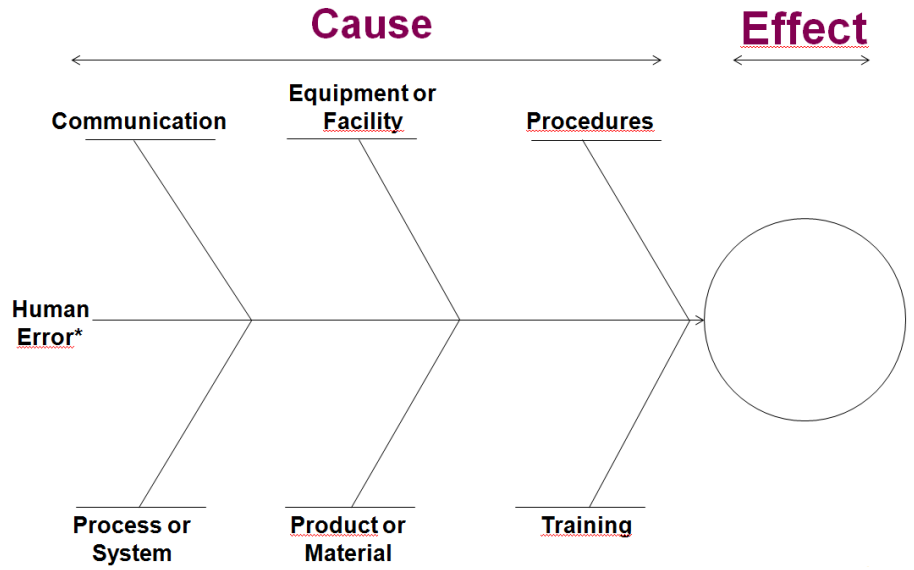
Consider sketching out the process

Assemble an investigational team of 3-5 people that typically include some, if not all, of the following:

- (1) An expert of the process to be investigated
- (2) A non-expert
- (3) The Prime Investigator
- (4) An additional operator within the process
- (5) A Facilitator

Investigate one problem at a time. If there are two problems observed consider using two sheets

*Human Error is rarely the Root Cause Ask Why? again!



Think Simple, Think Different Mindset

Think Simple, Think Different

- A challenge to reduce waste, complexity and bureaucracy
- Asks us: Who are our customers? What is it I do that creates value?
- Prompts us to reach out to others. What are others doing?
- Share & Celebrate

Continuous Improvement is a personal responsibility.

= >57,000 improvements / year



bryan.egner@astrazeneca.com

**Drug Product Delivery Functional Planner & Business Analyst
And Continuous Improvement Network Lead, R&D Supply Chain**

- Making medicinal chemistry more effective – application of Lean Sigma to improve processes, speed and quality.
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Drug Discovery Today. Volume 14, No 11/12, June 2009, 598-604
- Creativity, innovation and lean sigma: a controversial combination?
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