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Critical Chain

A variation on a theme or a significant difference?

Ian Heptinstall - Associate Professor of Project Management

Critical Chain?

"An interesting idea, but nobody is using it.
Surely if it was any good, everyone would be using it"

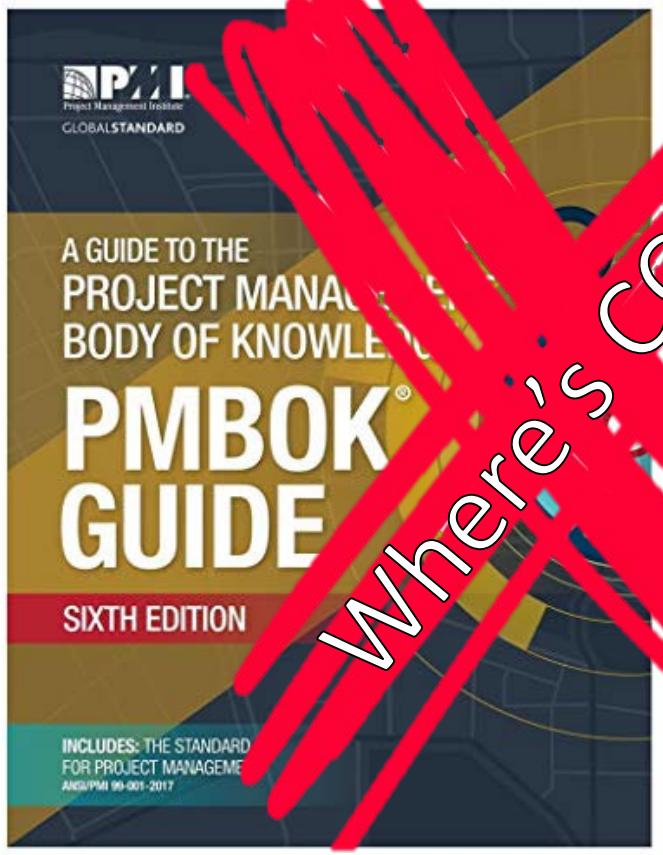
- What is it?
- Who is using it and what they say about it
- The Yin-Yang of Project Control

Why "*best practice*" may not be the best.

- "**consensus is almost always wrong** … it is in the slipstream of the fore-front thinkers and observers." *Eddie Obeng*

- "Don't take refuge in **the false security of consensus**, and the feeling that whatever you think you're bound to be okay because you're in the safely moral majority." *Christopher Hitchens*

2017



Where's CC Gone?

2019

Project Management Institute

PMI Project of the Year Award 2019

WINNER

E190-E2 Program Development Embraer

SÃO JOSÉ DOS CAMPOS, SÃO PAULO, BRAZIL

Learn more

"Critical chain gives us commercial advantage in … project management. We are more-and-more committed to using it in all our project management applications."

Mauricio Martins de Almeida Filho – Engineering VP, Commercial Aviation

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"Technology development was our strategic constraint. Critical chain was vital to achieving the environmental performance targets on SKYACTIV. It was the key to turning the company around"

Seita Kanai, Chairman, Mazda Motor Corporation

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Not only used on massive megaprojects

TATA

Diamond AIRCRAFT

SAFRAN

vivo

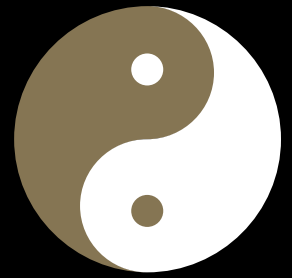
Endress+Hauser

So what is Critical Chain?

- Formal techniques for scheduling and monitoring/control
- Work flow management practices and behaviours

- Developed from Goldratt's Theory of Constraints. *The Goal*

1: The Principles of Project Work Flow



- Focus & Finish
  - Multi-tasking is Evil
- Limit WIP
  - Project Tasks & Portfolio projects
- Relay Runner
  - Pass work on ASAP
- Full Kit
  - Only start if you can finish
- Separate project & task plans
  - Project at “Level 2/3”
- Commit to how you will work
  - Not achieving task-level estimates.
- Frequent reporting
  - Daily/weekly
- Small Batches
  - Pass work on ASAP
- Continuous Improvement
  - Rapid cycles. PDSA

Baltazar Martinez
South Valley Landscape, California

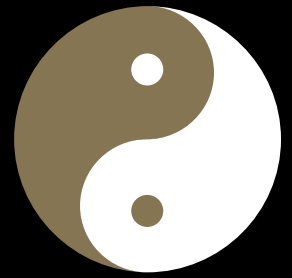
- Focus and Finish
- Stop starting and start finishing
- 28 open jobs -> 4-6

- Durations halved
- Turnover up 50% in 1 year
- Same team
- 70+-hour weeks to picking kids up from school

GSK UK

- Critical chain pilot for new product introduction.
- Now used across all NPI projects.
- Senior stakeholder confidence & reduced micro-management.

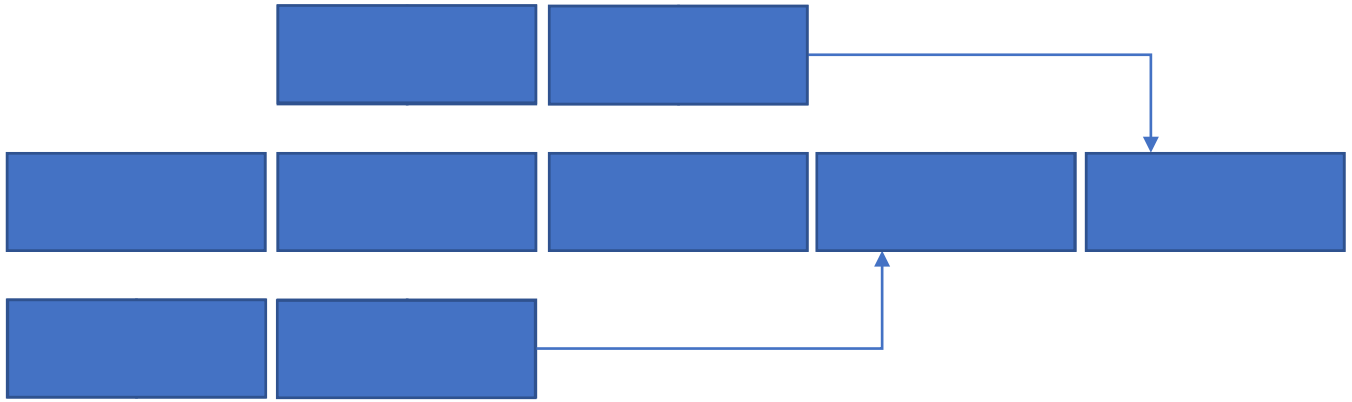
2: The formal technique of CC

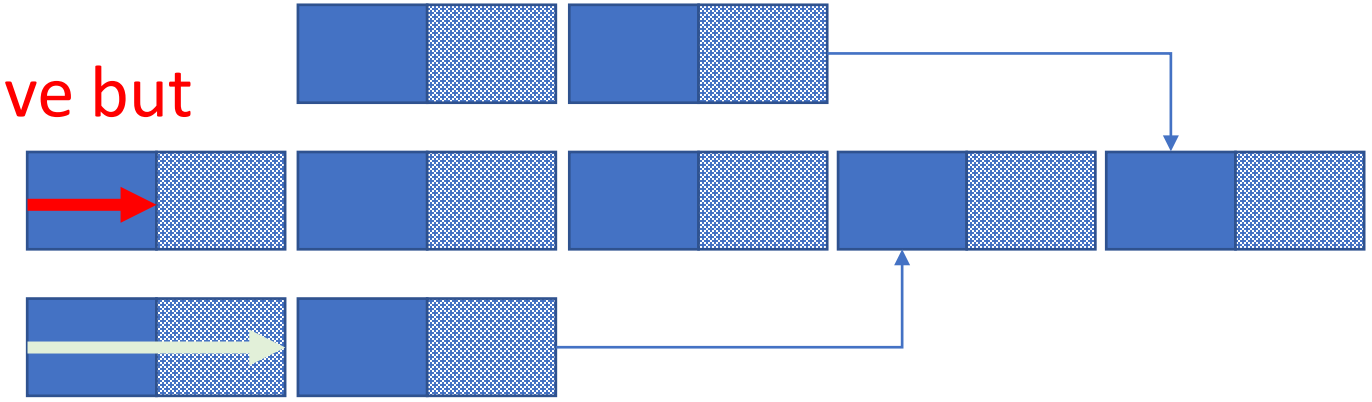


- Buffered Schedules
- Buffer Management – Key Project Progress Metric
- Portfolio Staggering

- Built on foundation common to all projects
  - *Task dependency network*
  - *Pull – Right-to-Left - Scheduling*

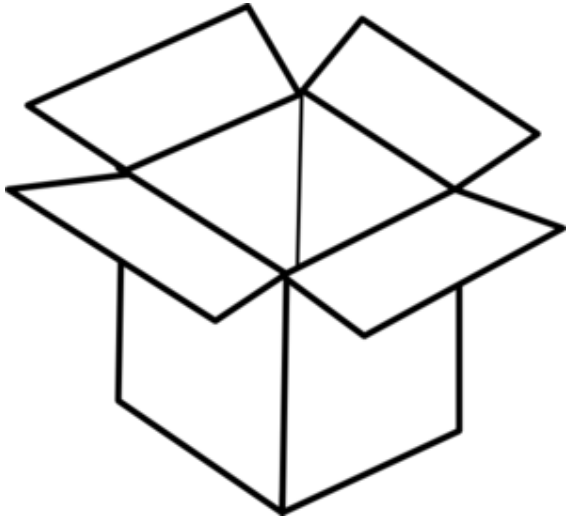
BUFFERS: Shared Safety

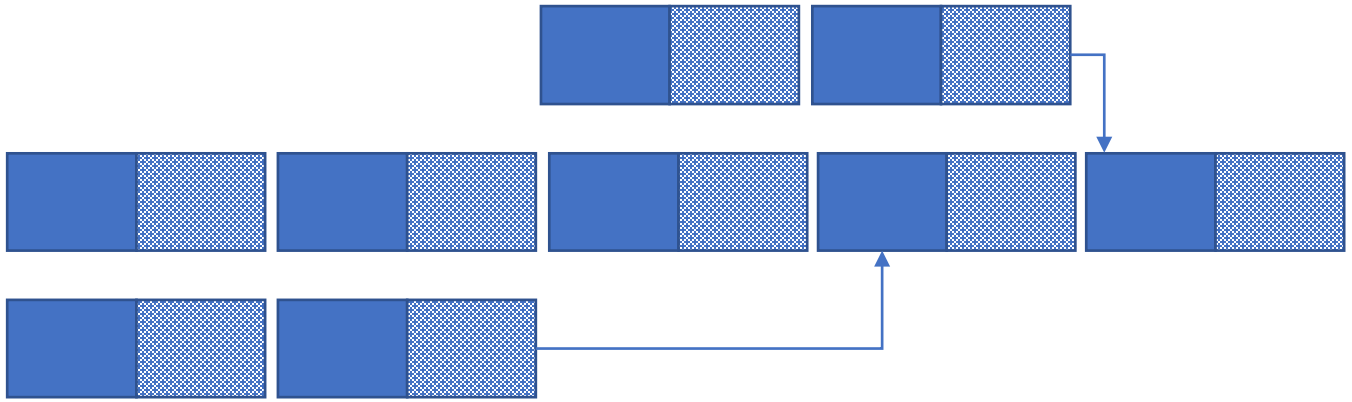


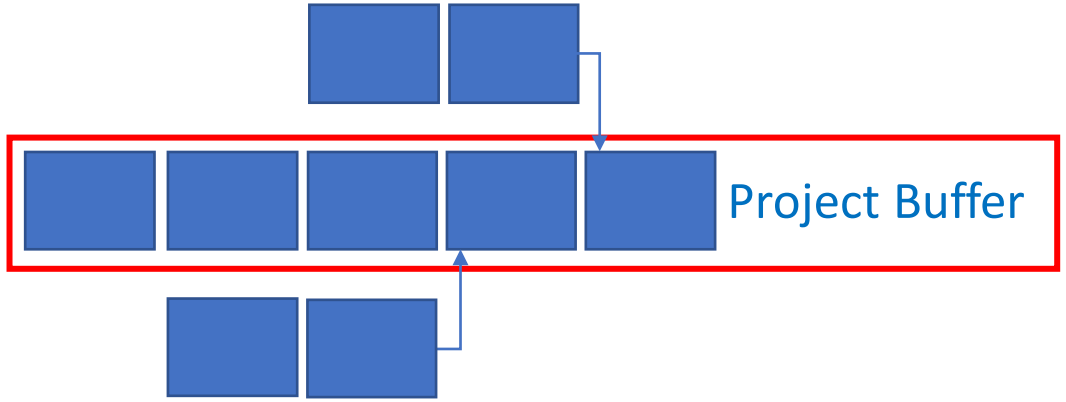


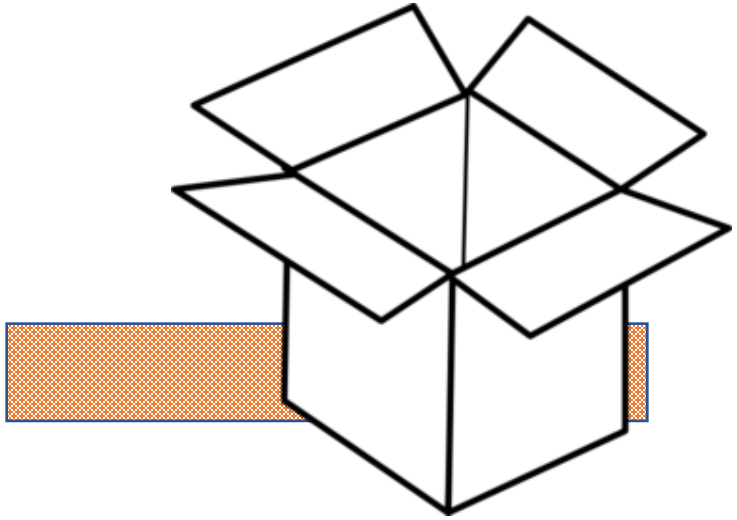
Aggressive but Possible

Highly Probable

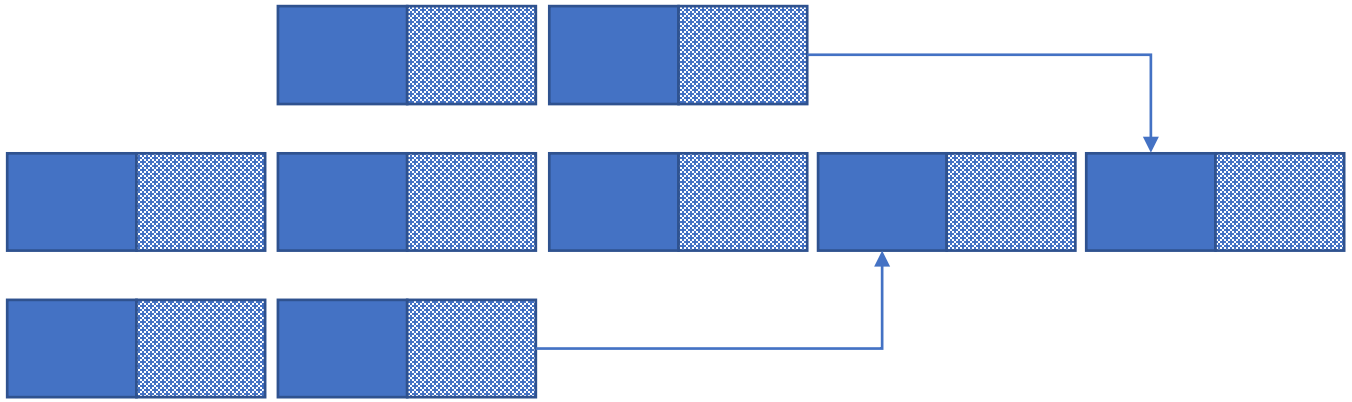




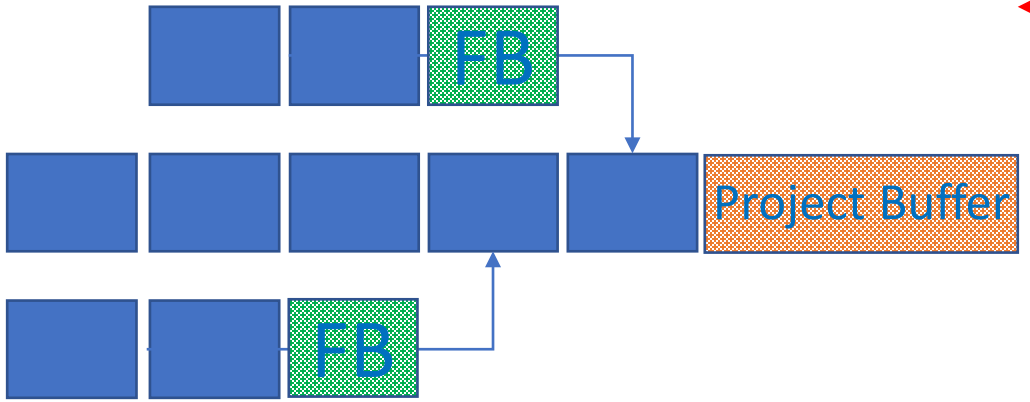

Project Buffer

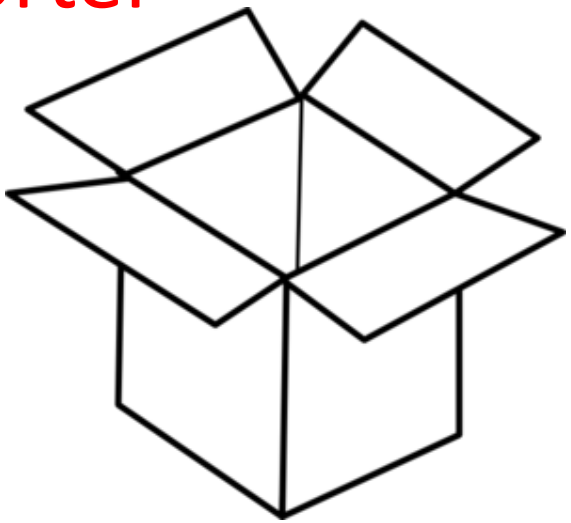


BUFFERS: Shared Safety



Typically 25% shorter

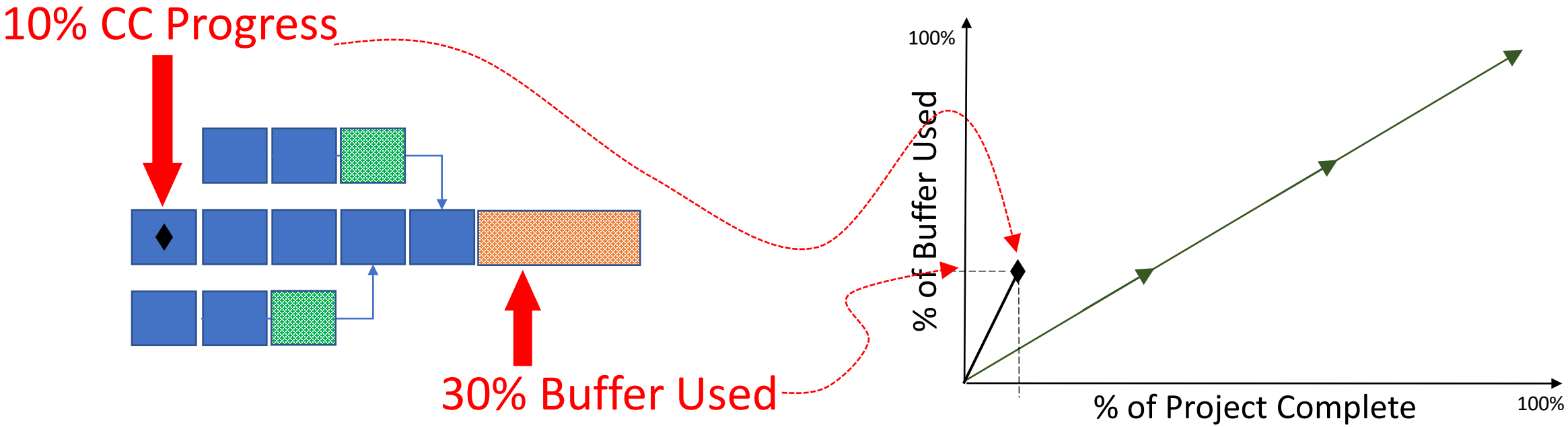




Surely that can't be it?

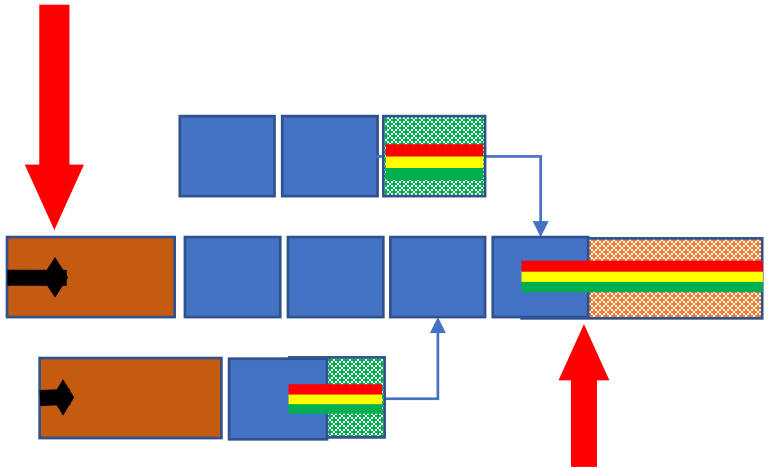
- All you have done is shuffled some numbers about
  - Same people. Same stuff to do
- Of course not! A buffered plan gives us:
  - A shorter, achievable duration
  - New tools that facilitate better execution control
    - Work priorities
    - Early Warning
- They facilitate and support the project work flow behaviours.
  - "Focus & Finish"
  - Remove waste and improve flow

Buffer Management



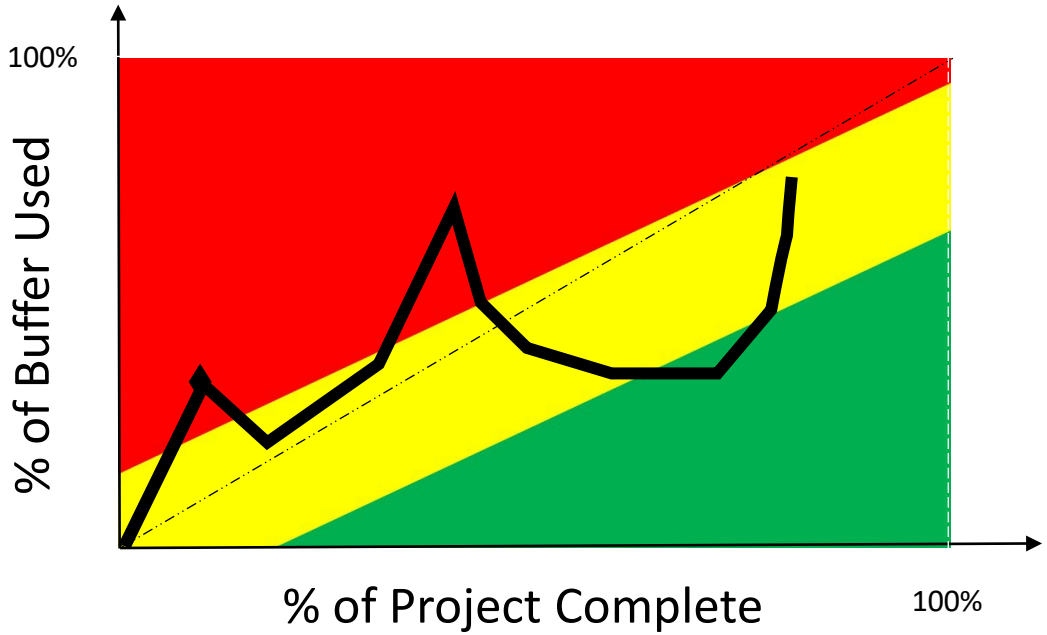
Buffer Management

10% CC Progress

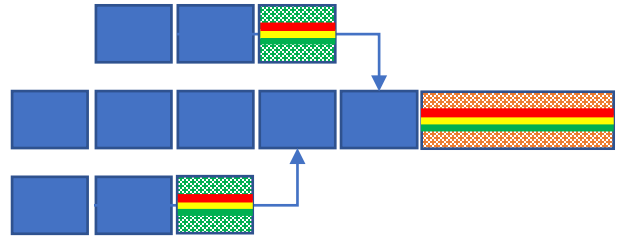


30% Buffer Used

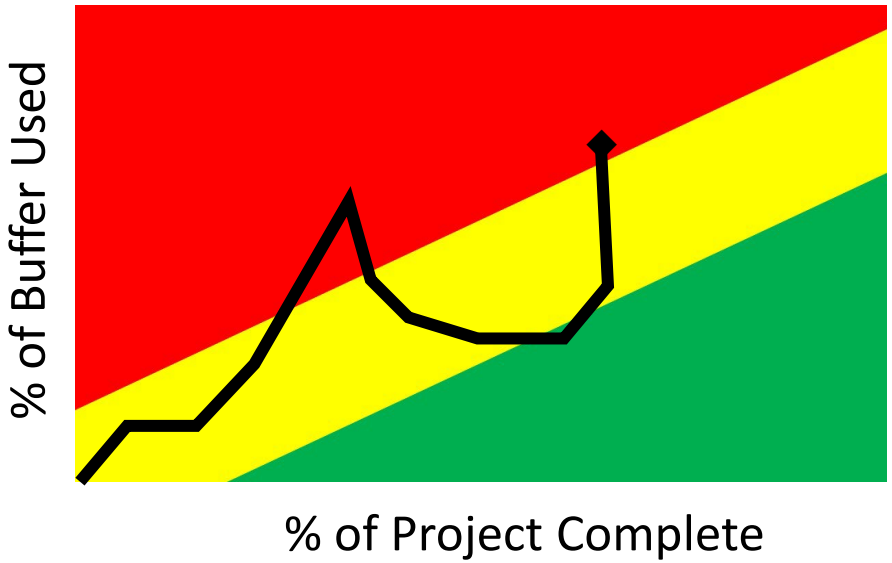
The Critical Chain Fever Chart



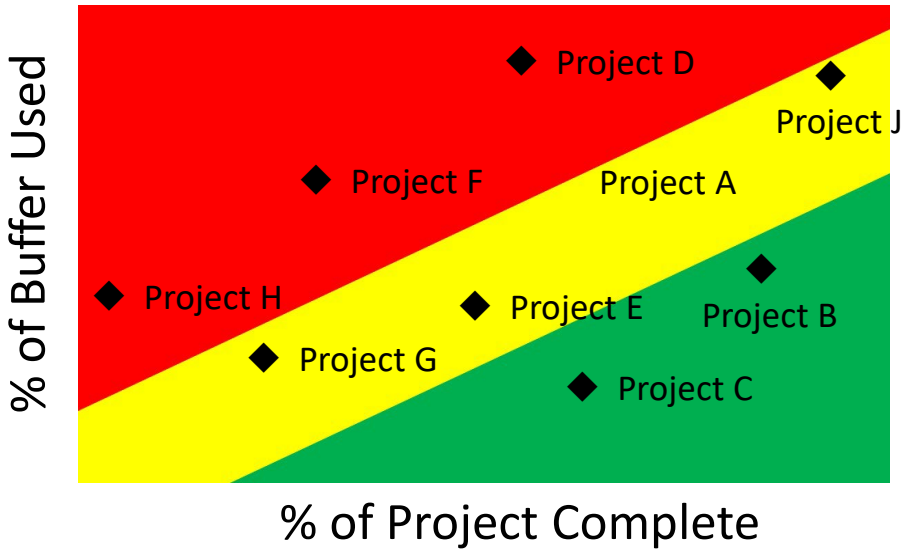
Buffer Management



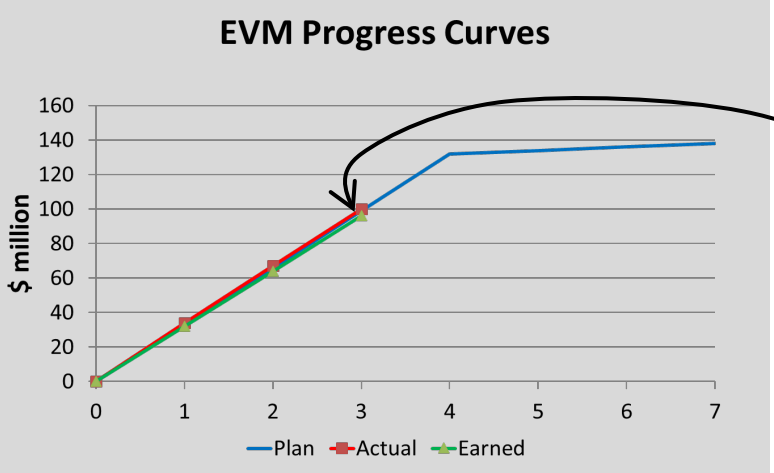
Project Fever Chart



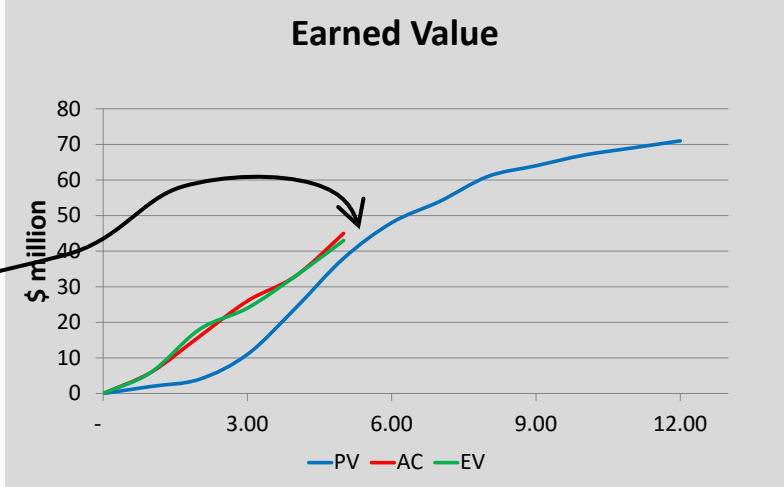
Portfolio Fever Chart

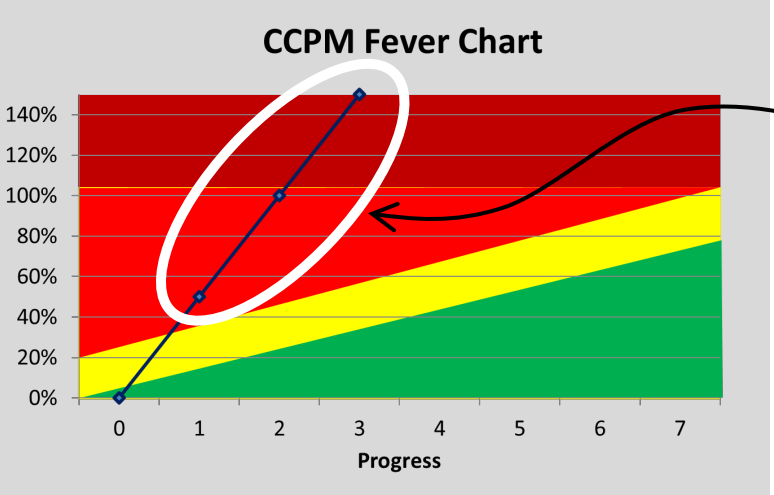


Additional early-warning

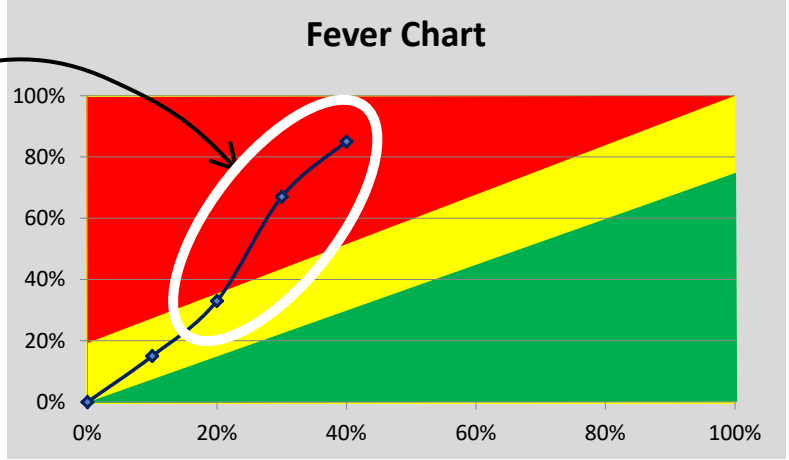


All is going well





Maybe not…



Plane	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018
Airbus A380		Actual								
Boeing 787			Actual							
Airbus A350				Actual						
Bombardier CS100					Actual					
Mitsubishi MRJ90					Actual					
Embraer E190-E2							Actual			

REFERENCE CLASS FORECAST

IT TAKES 80-100 MONTHS TO DEVELOP & LAUNCH A NEW PLANE

60 MONTHS PLAN

BAE Systems and Critical Chain

BAE SYSTEMS

- Local success in the past
- Global piloting 2020 of CC
- Today over 12 major programmes using CC
- Sponsorship of the APM Guide to Critical Chain

UNIVERSITY OF BIRMINGHAM

Critical Chain

A variation on a theme **and** a significant difference?

Ian Heptinstall - Associate Professor of Project Management

Transformational Forward Looking Methodology for Neonatal Intensive Care Unit

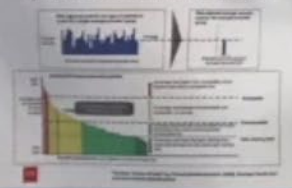
Kathy Kohl, RN, MHA | Tyler Shugarts, MBA | Don Mueller, CEO, FACHE
Bill Taylor | Danny Walsh | Michael Harris, MD

Children's Hospital of Erlanger is the only Level IV NICU within a 50,000 square mile area of Chattanooga. The demand for service has increased significantly over two years, and the unpredictable patterns of NICU admissions has stretched our bed capacity and nursing resources. Children's Hospital anticipates NICU reimbursement methodologies will shift financial risk to the hospital, as more emphasis is placed on LOS.

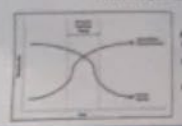
Background

- ADC of 103% (Low 86% : High 114%), expanded NICU to PICU and post partum nursery.
- Inconsistent discharge patterns among attending Neonatologists.
- Increased scrutiny on NICU costs and LOS.
- 2nd wave TAG (Overall NICU expenditures in TN).
- Nursing shortage, use of travelers & increase premium pay.
- Limited collaboration between Maternal Fetal Medicine and Neonatology.

Episodes of Care: Incentives



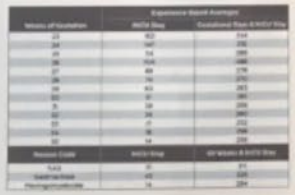
Transitioning from Fee-for-Service to Value-Based Reimbursements



Objective

To develop a forward looking, collaborative care planning tool for resource planning and length of stay management to optimize patient flow, nursing resources and bed availability.

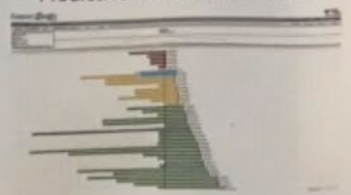
Predictive Model for NICU LOS



NICU Daily Huddle

Patient Centered Care

Predictive Model for NICU LOS



Projected NICU Occupancy Facilitates Staffing and Anticipates Other Resource Needs

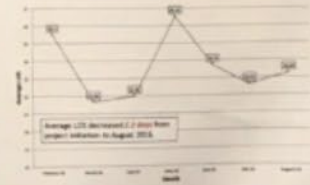
children's Hospital at Erlanger

Exepron Health

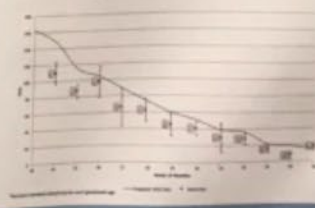
Methodology

- Develop a predictive model for LOS using gestational age and commonly used diagnosis, including surgical interventions.
- Establish collaborative huddles with case management, physicians, nurses, social workers and lactation to discuss discharge planning.
- Improve collaboration with Maternal Fetal Medicine to provide pipeline of expected high risk infant admissions and anticipated LOS in the NICU.
- Plan expected bed and staff resource usage to determine if additional beds are needed in the PICU and post-partum nursery or consider transfer to lower level NICU.

NICU Average Length of Stay Using Exepron Forward Looking Model



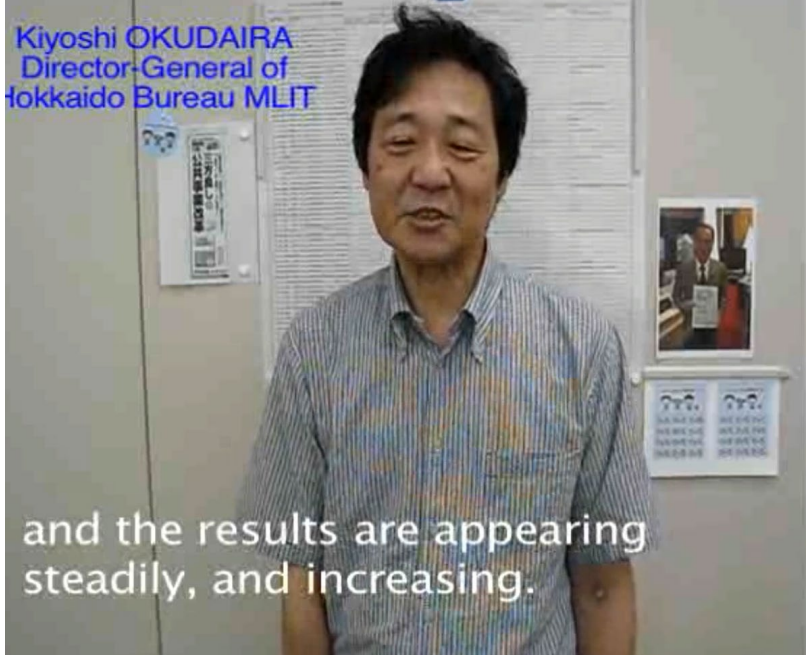
Actual LOS vs. Predicted LOS by Gestational Age

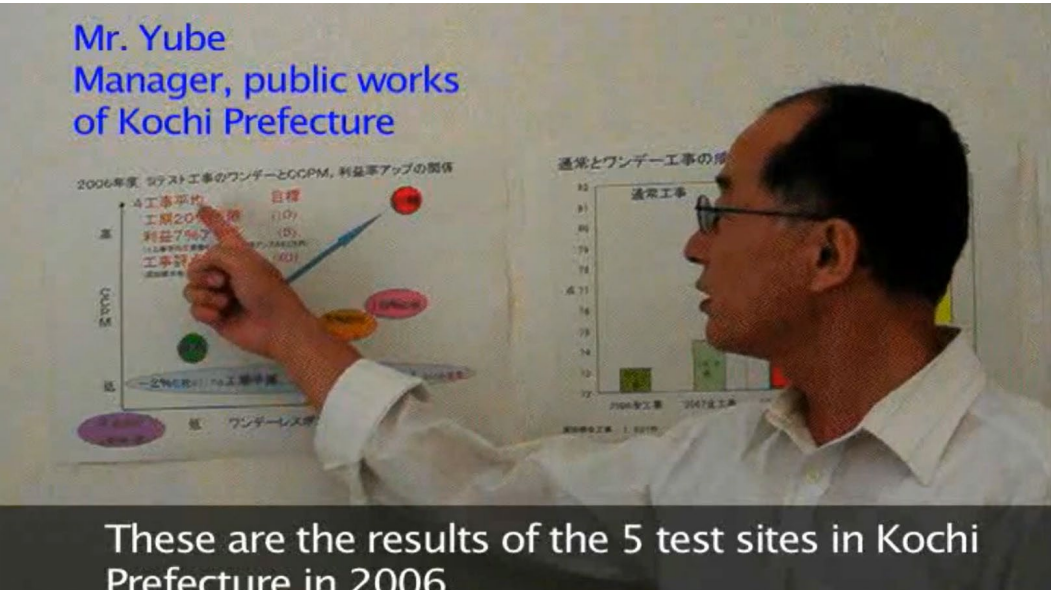


Lessons Learned

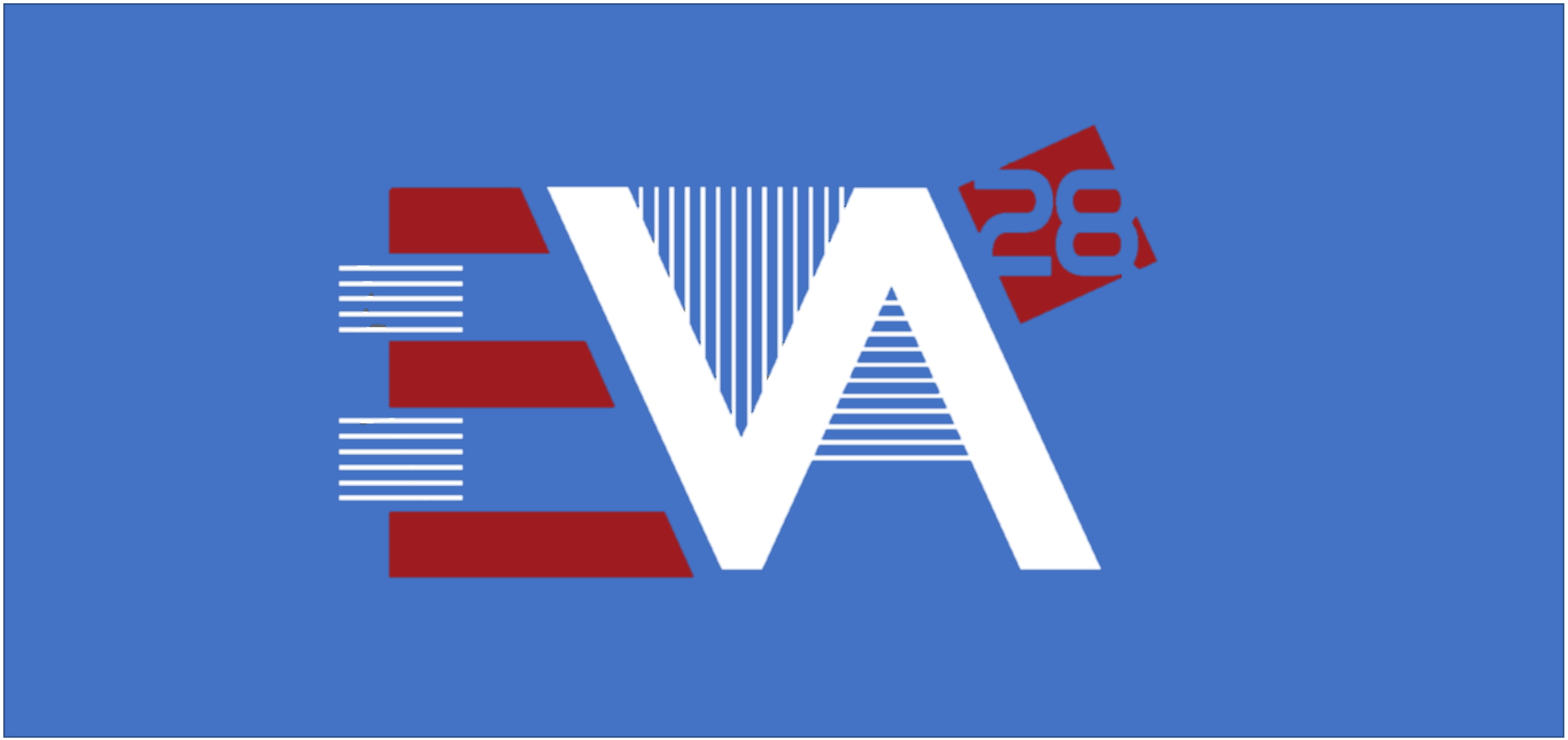
- Increase perinatal collaboration between Maternal Fetal Medicine and Neonatology to better plan for high-risk infants who may require NICU admission.
- Case Management should play a proactive role in utilizing the Exepron tool with the health care team to ensure ongoing daily collaboration regarding LOS and discharge planning.
- Model should be expanded to all NICUs at Erlanger to create a "system of care" approach for managing LOS.
- Historical data should be used to continually evaluate the predictive model and make adjustments as needed.
- For complex cases with surgical intervention, having subspecialties attend huddles as needed should be considered.
- HCAHPS score for Overall Hospital Rating has reached a percentile ranking of 86.96, as a result of collaborative communication.
- Next steps:
  - Monitor readmissions.
  - Proactive planning for bed expansion based on modeling.
  - Compare post-implementation discharge patterns by attending physician.

Yoshichika Takai
Director
Meishi National Highway Office
MLIT


Kiyoshi OKUDAIRA
Director-General of
Hokkaido Bureau MLIT
and the results are appearing
steadily, and increasing.


Mr. Yube
Manager, public works
of Kochi Prefecture
These are the results of the 5 test sites in Kochi
Prefecture in 2006

国土交通
Ministry of Land, Infrastructure, Transport an
観光
Japan Tourism Age
海上保
Japan Coast Guard



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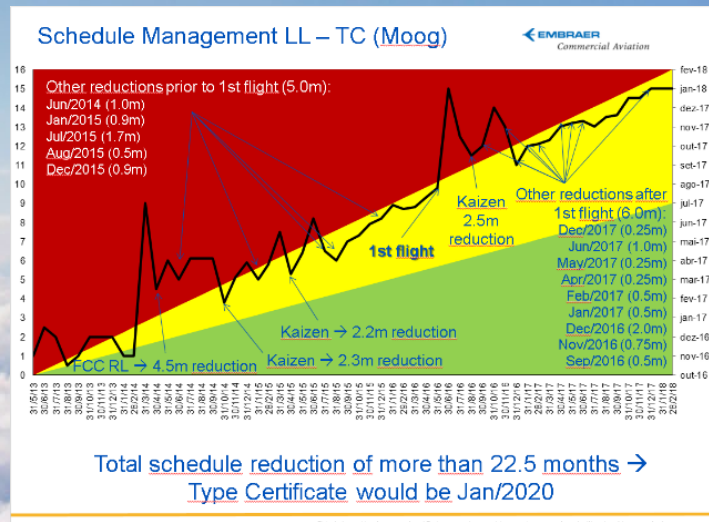
Mauricio Martins de Almeida Filho – Engineering VP, Commercial Aviation