



Optimized Installation Flow – A Strategy for substantial cycle time reduction



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Project (130/199) milestone celebration: reduction of 94% 37d → 2.11d



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“Our mission was to reduce construction duration by 50% on average without adding overtime and without adding more resources”



Semi Conductor Construction



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Environment:

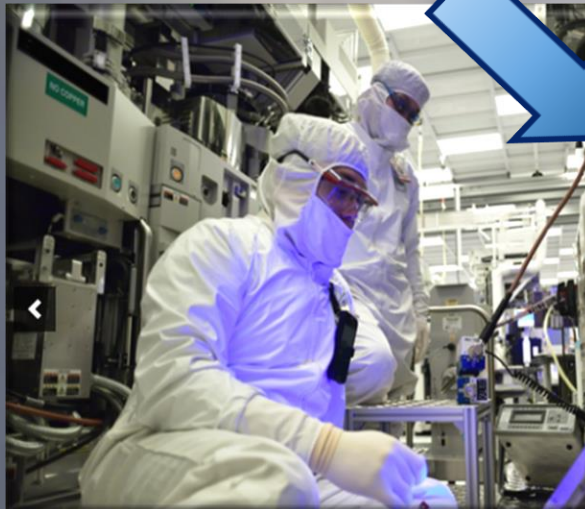
- Fierce competition
- Industrial system infrastructure installations
- Live manufacturing
- Mission critical
- Constant change

Challenges:

- Complex & congested projects
- 25 parallel projects
- Architectural, electrical, mechanical and piping
- 8 types of waste

Unique characteristics:

- 3 floors gembas
- Many chemicals, gases, ultra-pure water, exhausts, electrical power
- 50-70 different utilities and services with orbital welds
- >100 connections



Undesired project delivery effects:

- Low Productivity
- Less Predictability
- Bad Performance
- 2nd shifts, accelerations...



OIF – Optimized Installation Flow – “Touch the Project Once”

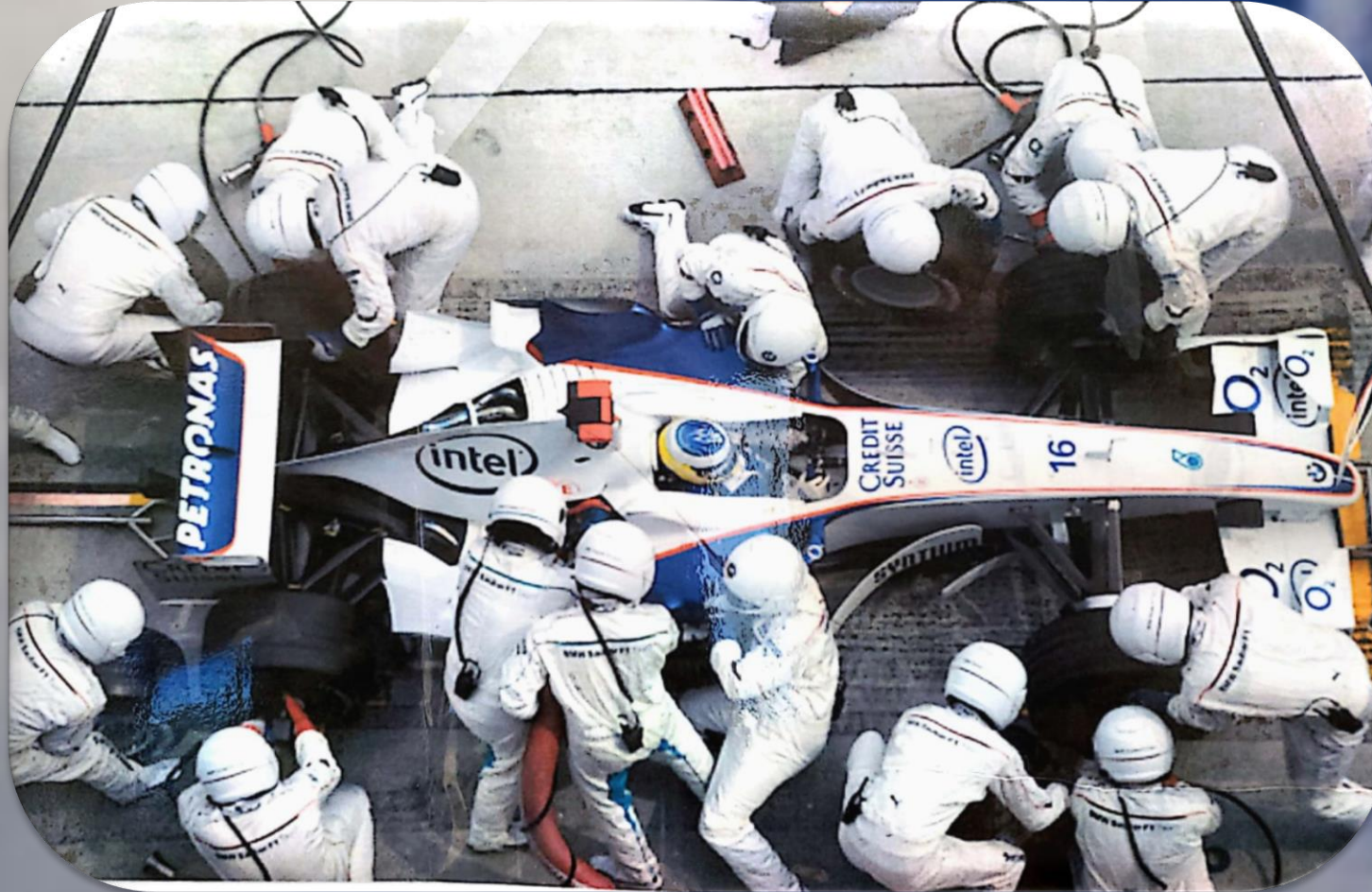


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PIT Stop



Our PIT Stop “Touch the Project Once”



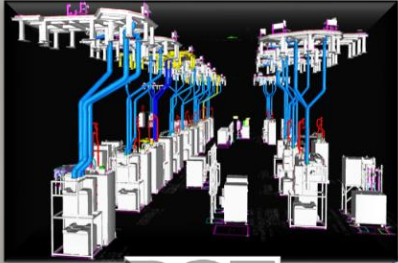
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PIT:
Project
Integration
Team

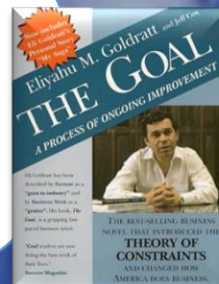




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Portfolio, Process, Operations

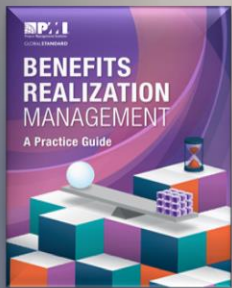
Strategic Project Leadership

Lean Construction & LPS

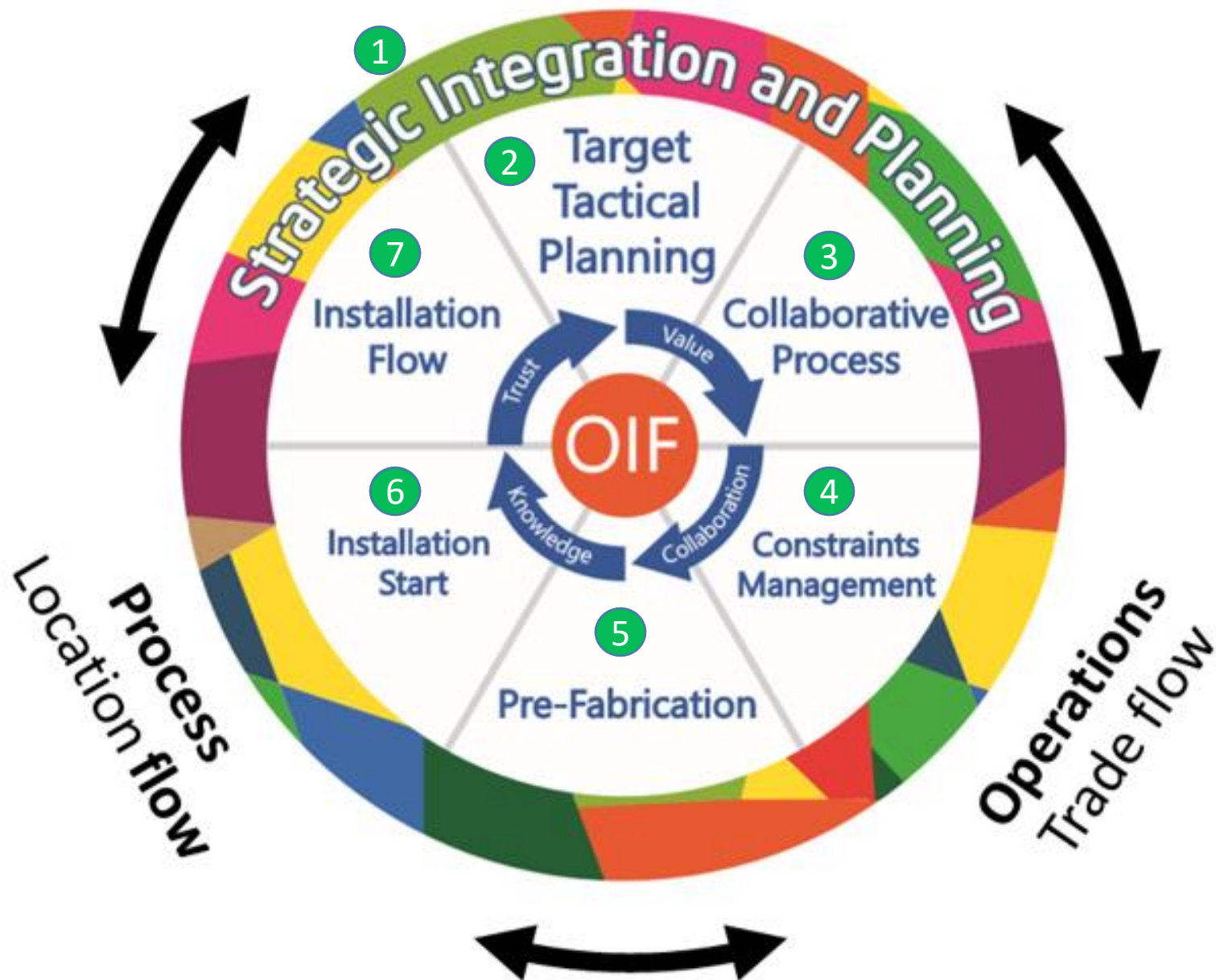
Theory of Constraints

Supply Chain Excellence

Benefits, Portfolio & Program management



Portfolio Project flow

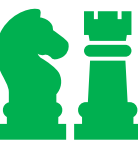


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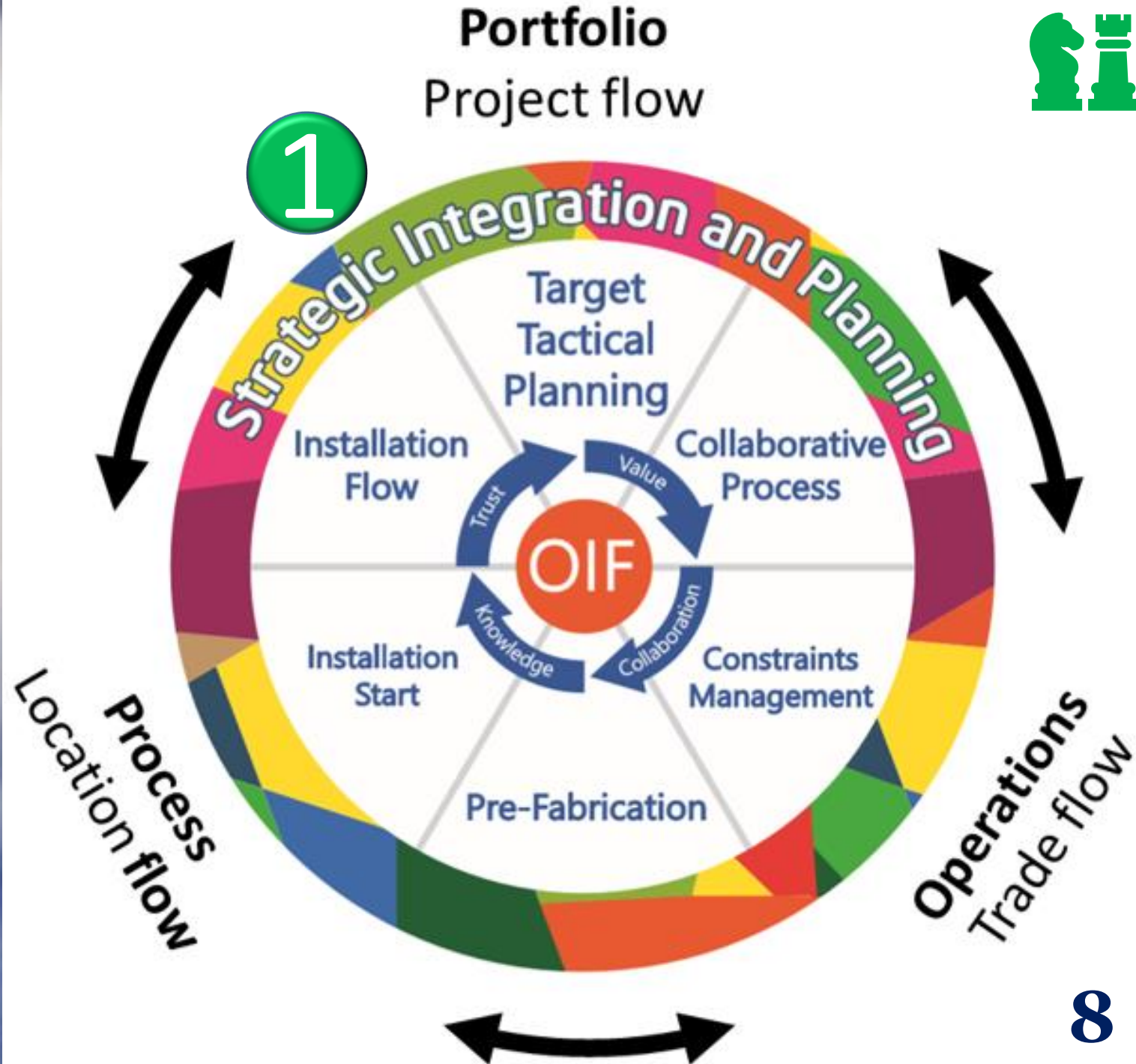
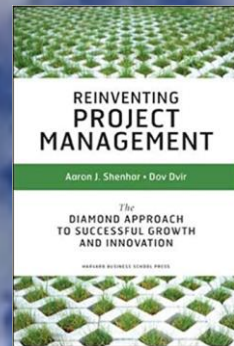
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OIF Flywheel: The 7 Principles maximizing All 3 Flows



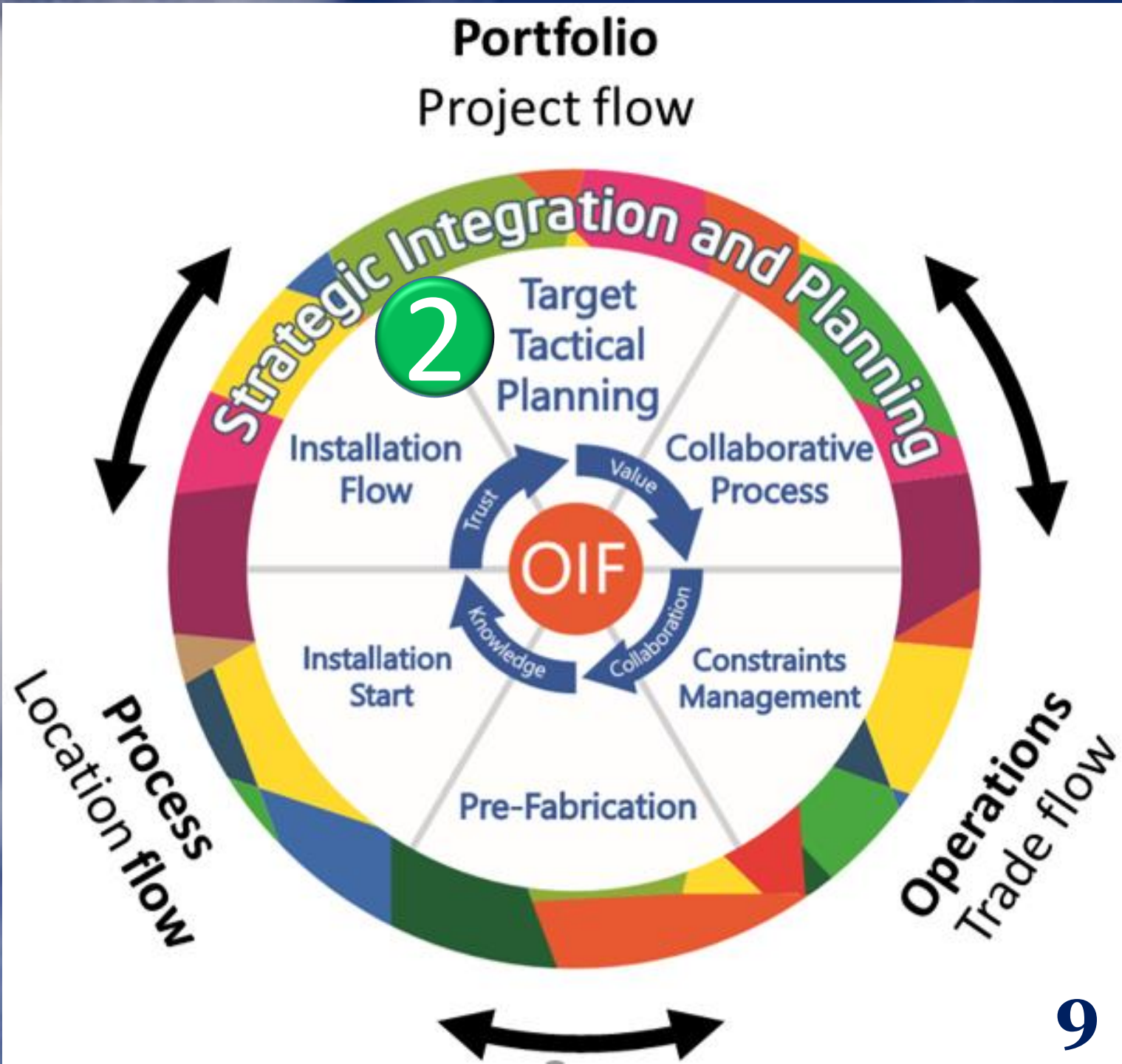
Principle #1 – Strategic Integration & Planning:

- ✓ Achieve organizational strategic goals using minimum resources
- ✓ Project Strategy: “project perspective, position and guidelines on what to do and how to do it, to achieve the highest competitive advantage and the best value from the project outcome...”



Principle #2 – Target Tactical Planning:

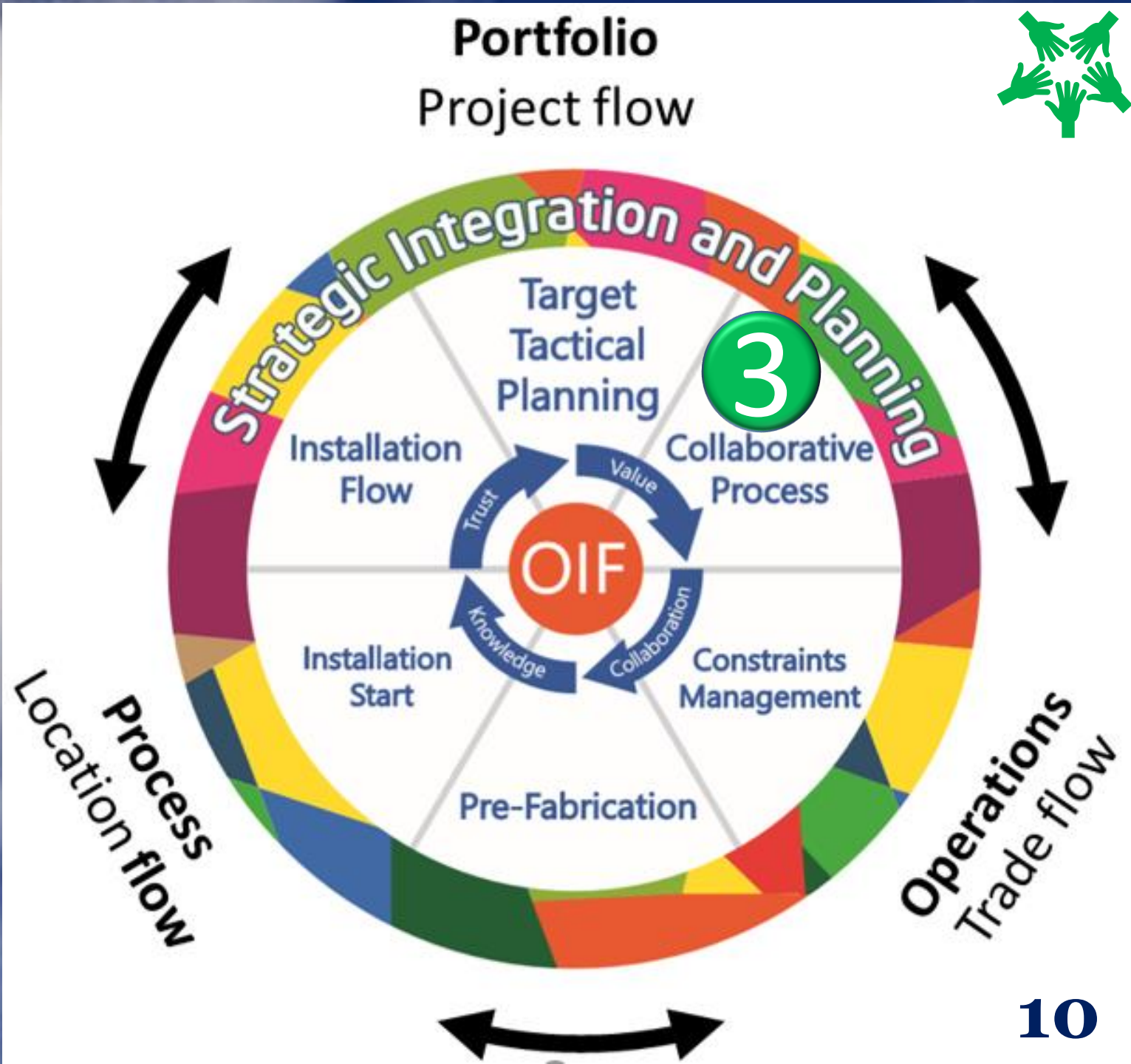
- ✓ Target per project
- ✓ Target constrains the pull-plan durations and leads to innovative delivery → Challenge sequential construction logic

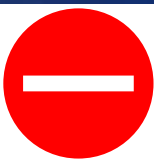




Principle #3 – Collaborative Process:

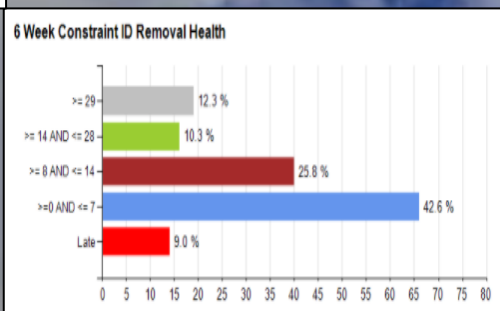
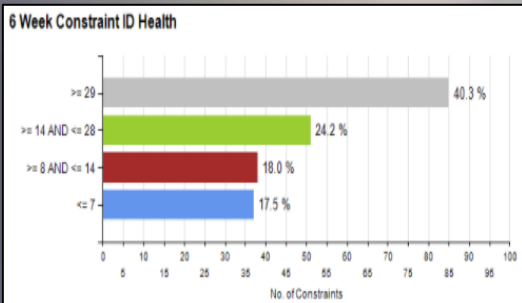
- ✓ Project strategy initiation
- ✓ Target setting
- ✓ Pull-Plan development
- ✓ Plus & Delta
- ✓ Team recognitions
- ✓ Continuous improvement





Principle #4 – Constraint Management:

- ✓ Cross project critical constraints - scarce trade recourses
- ✓ Physical constraints
- ✓ Information constraints
- ✓ Onboarding constraints

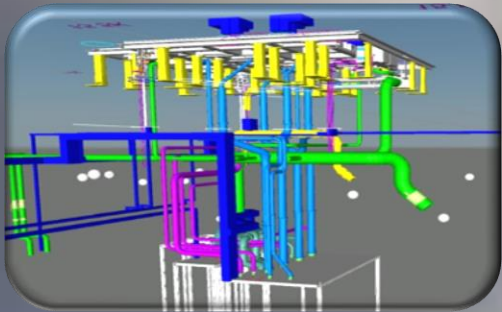


Portfolio Project flow



Principle #5 – Maximize Pre-Fabrication:

- ✓ Reduces durations
- ✓ Reduces num of trades in Gemba
- ✓ Shifts skilled personnel to work at their facility where their productivity is higher



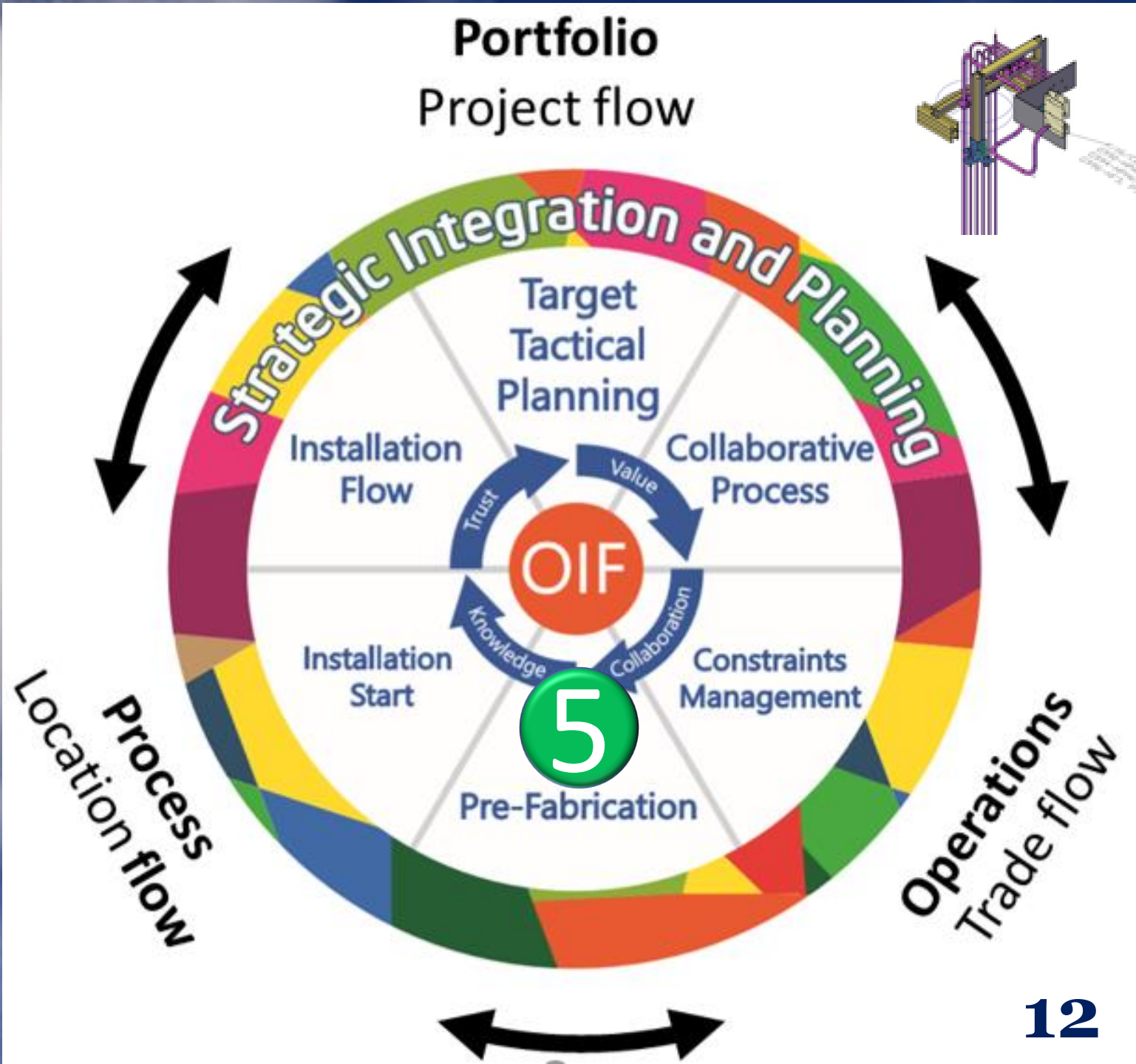
Integrated Model



Model & Scan

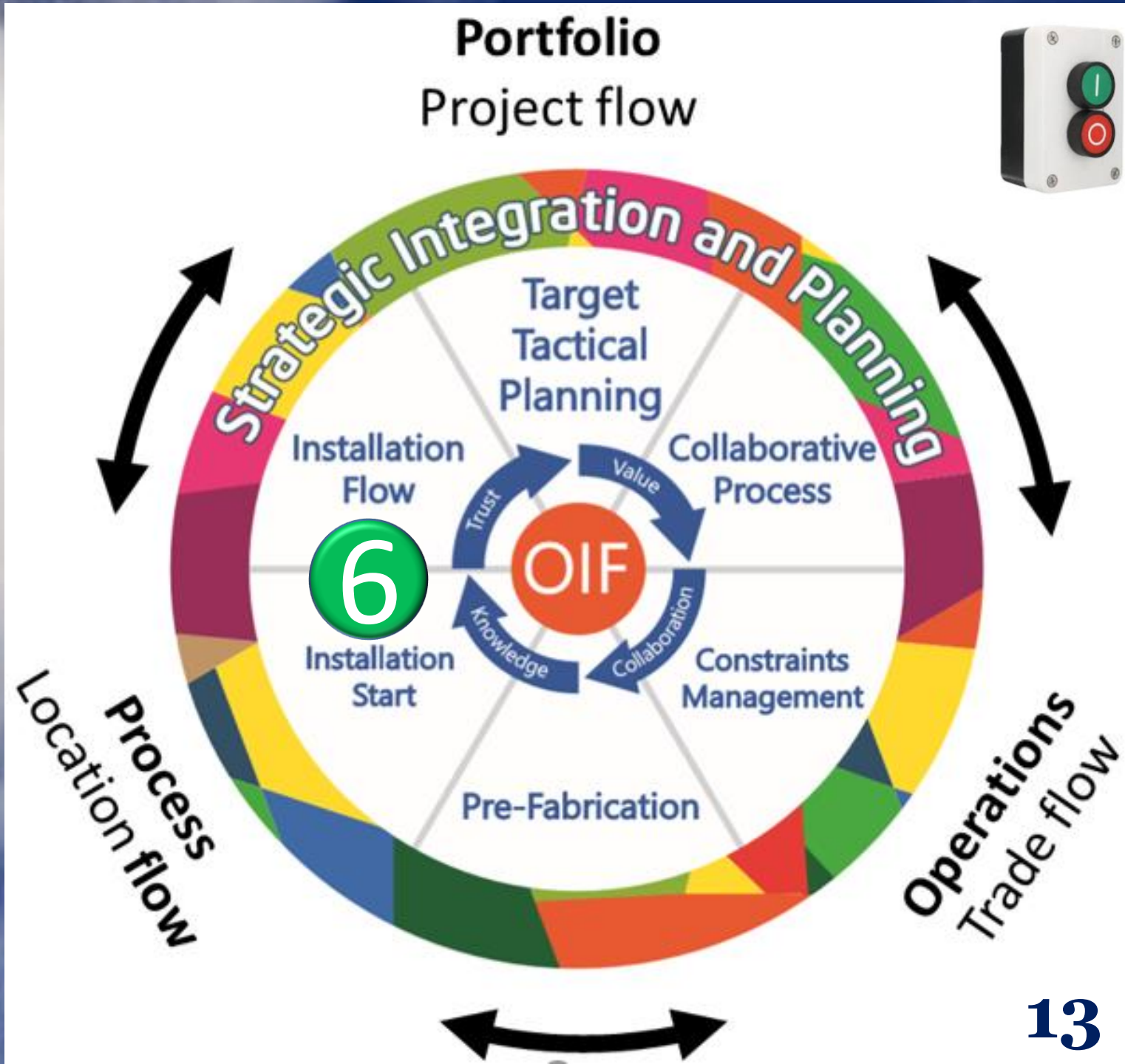


Pre-Fabricated spools



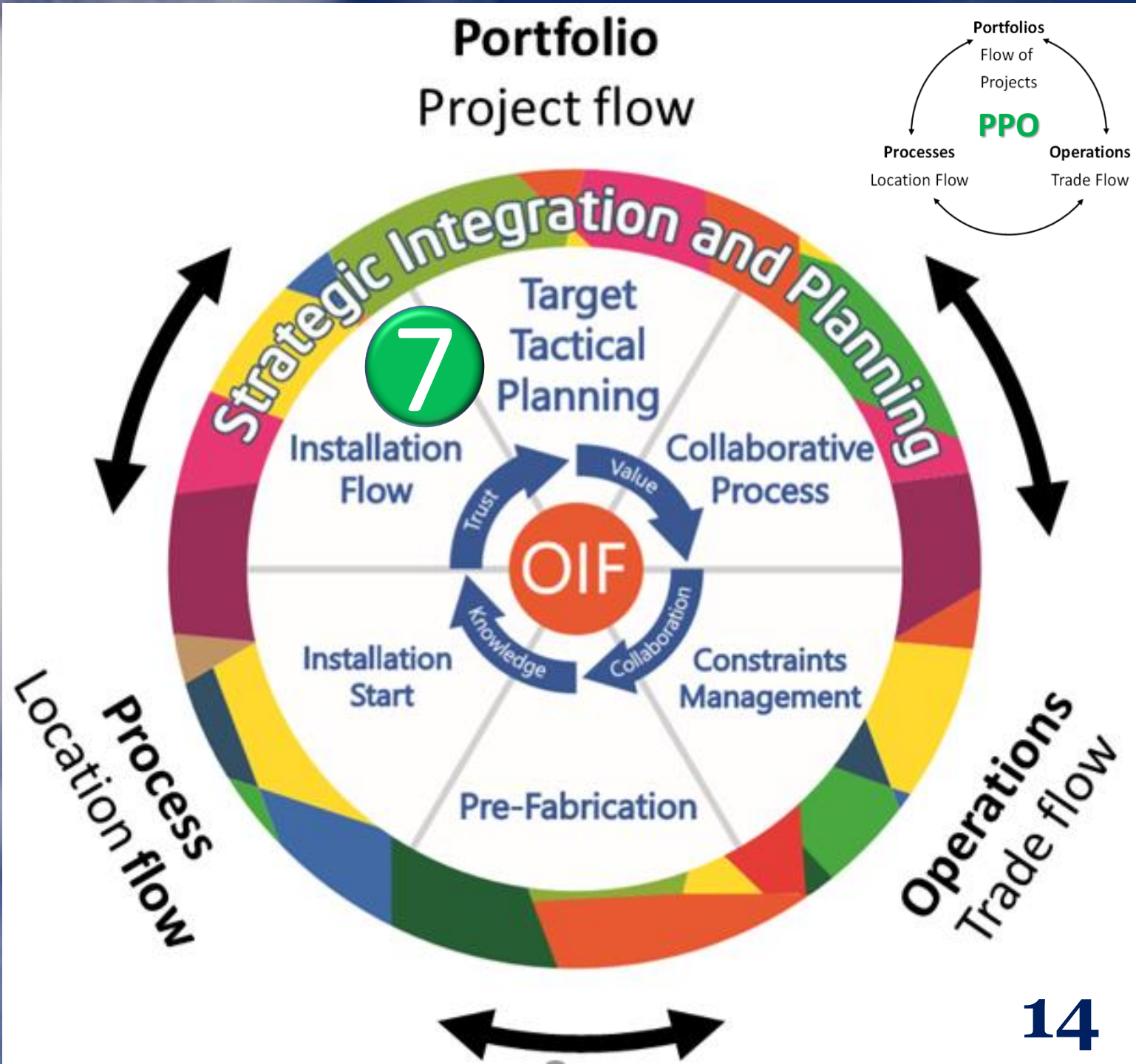
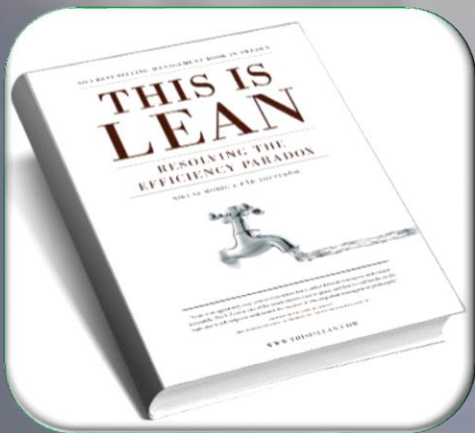
Principle #6 – Control Installation Project Start:

- ✓ Identifying when project can really start without stopping (“sound project”, “full kit”) → ALL predecessors and constraints removed
- ✓ Program cadence → velocity



Principle #7 – Ensure Project Installation Flow:

- ✓ Project tasks are performed without interruption
- ✓ “improve workflow reliability in order to improve operational performance” (Ballard & Tommelein. 2016)



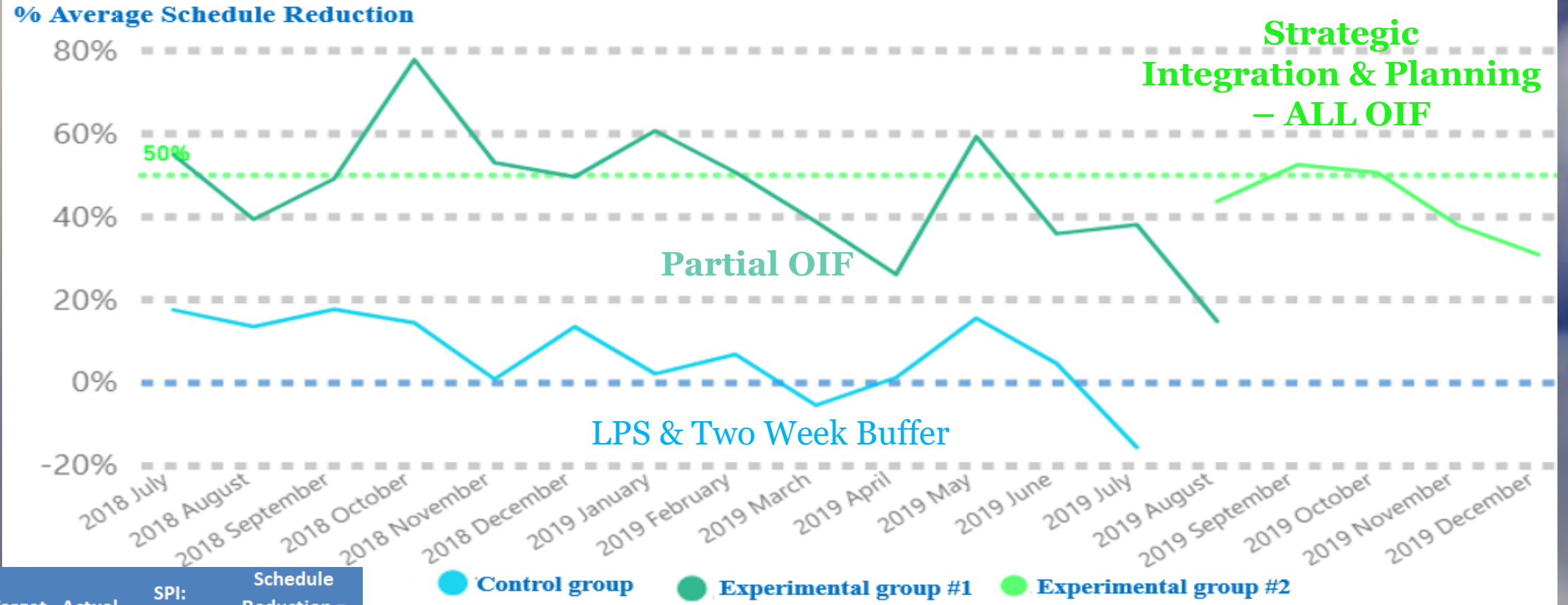
Results – 3 Generations of Projects Delivery within 1 Program



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Standard Duration [d]	Target [d]	Actual [d]	SPI: EV/PV or Velocity	Schedule Reduction = waste elimination
37	3	2.5	14.8	93%
46	6	8.5	5.4	82%

Results

Table 2: Average and Std. Dev. of schedule reduction for the different approaches. The groups were compared using a One-way ANOVA statistical test.

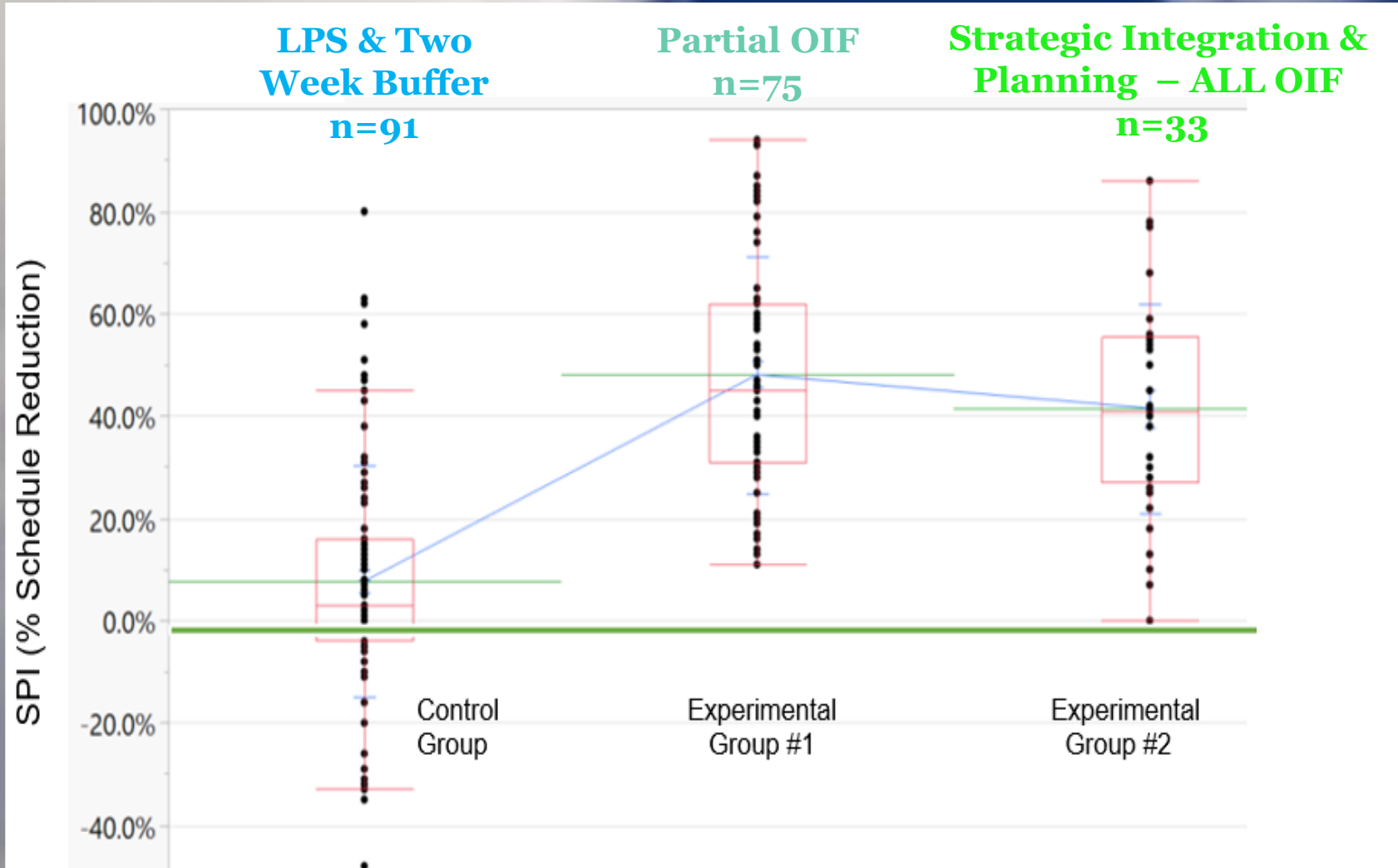
Variable	Control group	Experimental group #1	Experimental group #2	F _(2,196)
% schedule reduction	8% a (23%)	48% b (23%)	42% b (21%)	72.86*** (***p < .001)



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It's All About People, Collaboration, Teams, Trust



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LPS is not enough!

Integrated
Operating
Strategy

PPO = What
OIF = How

Scalable,
Repetitive,
locally &
globally





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I would like to thank

- ✓ **Dr. Ayala Daie-Gabai**, my **wife**, for believing in and pushing me to excel, innovate, explore and collaborate
- ✓ **Prof. Rafael Sacks**, my **partner**, for mentoring and providing insights to myself and LCI Israel CoP
- ✓ **Prof. Aaron Shenhar**, my **partner**, for mentoring and strategy thinking
- ✓ **Vered Leshem**, my **manager**, for sponsoring my experimentations and guidance within our organization
- ✓ **Nate Henshaw**, my **mentor**, for challenging me to improve OIF and for deploying it company-wide in Intel
- ✓ **Shay Golan**, my **leader**, for offering me the PIT Leader role to introduce innovations and change in construction culture
- ✓ **Dan Doron**, my **guru**, for believing in me and steering my career to applying strategic thinking

Back Up



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Category	Before	After	Benefits / Savings					Comment
	Standard MOO	OIF MOO	Time	Cost	Efficiency	Quality	Safety	
Measurements, Pre-Fabrication	Spool by spool, manual --> 10 days (400 hrs.) by 4 workers; All EV line and exhausts are measured and manufactured on-site	Using 3D --> 2 days (80 hrs.) by 4 workers; <u>Only last spool</u> is measured and installed on site	4 workers x 7 days 	320 hr. 	High + allow Elec and ducting works in parallel 	99% accuracy	Less 6 days working in heights	
# of spools measured on site	50	7			Only 7 EVs measured at CR 			7 EV lines
Total welds	150	40	10 welding days x 2 workers 	200 hr.	8 welding days instead of 18 	Improved as 70 welds done in workshop		Other 40 were used via kits - no need for welding
Welds in CR	4 days	2 day 	2 	40 hr.	2	Improved - less failure rate		
Installation in CR	10 days	4 days 	6 days 	120 hr.	High	High		

