



Building smart
nurseries for a
changing environment

Silviculture 4.0 Symposium

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Drive Operational Excellence

- Increasing value and reduce risk through maximizing FG delivery:
 - Increase seed use efficiency
 - Increase deployment of cuttings
- Building on our safety initiatives

Grow Our Business

- Supply plant requirements to own and out growers on time
- Alternative products

Sustain Our Financial Health

- Reduce unit cost of plants to the business
- Maximize external revenue opportunities

Enhance Trust

- People development
- Staff engagement
- Customer engagement

History – KwaMbonambi Nursery

- Purchased Waterton Timber Company - October 1988
- *E. grandis* main genotype – diseased
- Accelerated breeding
- Macro cuttings deployment
- Capacity
- Process flow



History - continue

- Water supply
 - Mavuya River
 - Mzenduzi River
- Water quality
 - pH 2.9



History – Twello Nursery

- Barberton - Mpumalanga region
- *P. patula*, *P. taeda* & *P. elliottii*
- Open Root Nursery
- Research - Pine Cutting Propagation
- Construction one million cuttings operation
- Sappi acquired Twello in 1996



Escarpment Nursery

- Several changes, enlargements and improvements were made over \pm 25 years
- 3.2 million Pine cutting capacity



Richmond Nursery

- Construction started in 1991/1992
- Simple cost-effective operation
- 16.5 m seedling capacity
- 36 permanent staff
- Storm damage
- Water supply



Ngodwana Nursery

- First constructed between 1986 & 1989
- 18 million seedling operation
- Rebuild started in 2015
- Water & electricity supply
- Capacity
 - 10 m seedlings
 - 7 m cuttings



Clan Nursery

- Construction started in 2011
- Two phases
 - 7 m GU
 - 17 m GU, GN & PPTL
- Site selection
 - Water quality & quantity
 - Labour



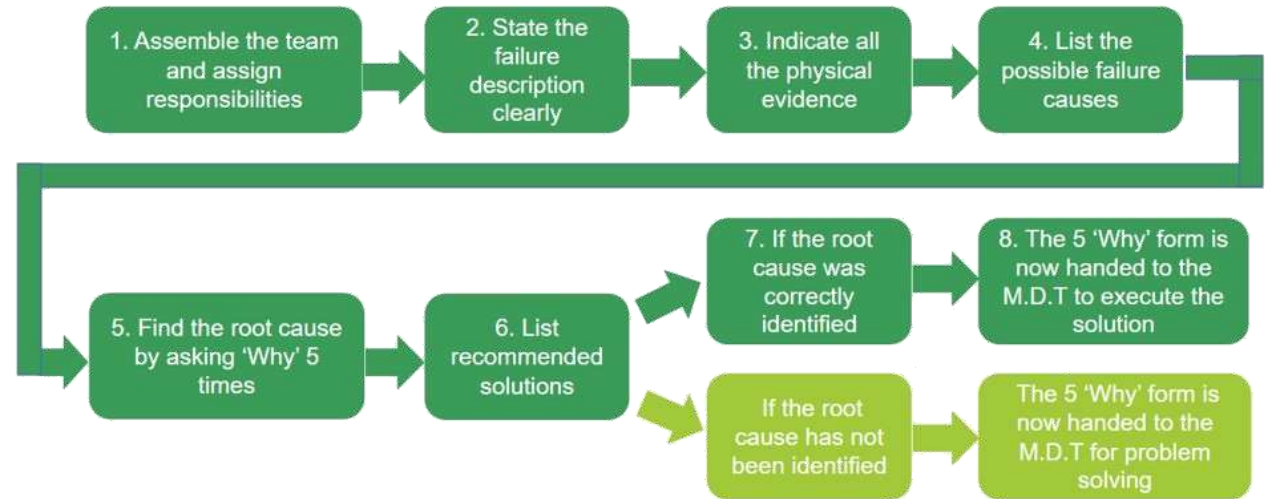
Challenges

- Global warming
 - Reduced planting window
 - Larger nurseries
 - Ellepot tray
- Increased plant demand
- Conversion to cuttings
- Ageing Infrastructure
- Pest and diseases
 - Lack of chemicals
- Rooting efficiencies



Lean Manufacturing

- AIM – process optimization
- MDT – led by process engineer
- Reason: build up data for focus areas
- Value stream mapping (VSM)
- Time studies
- RCA (root cause analyses)
- FTA (fault tree analyses)
- Lead to specific outcome / recommendations



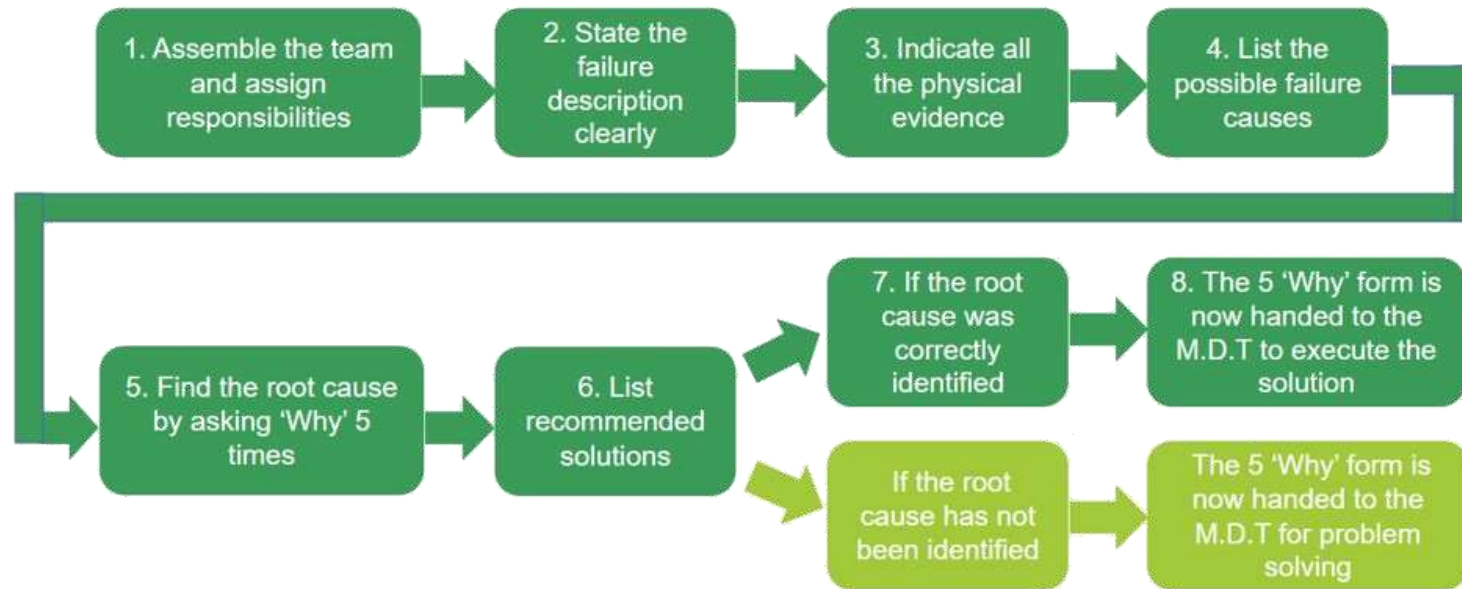
Old process flow

sappi



Lean outcomes - focused areas

- Aim to increase rooting efficiency by 15%
- Identified focus areas



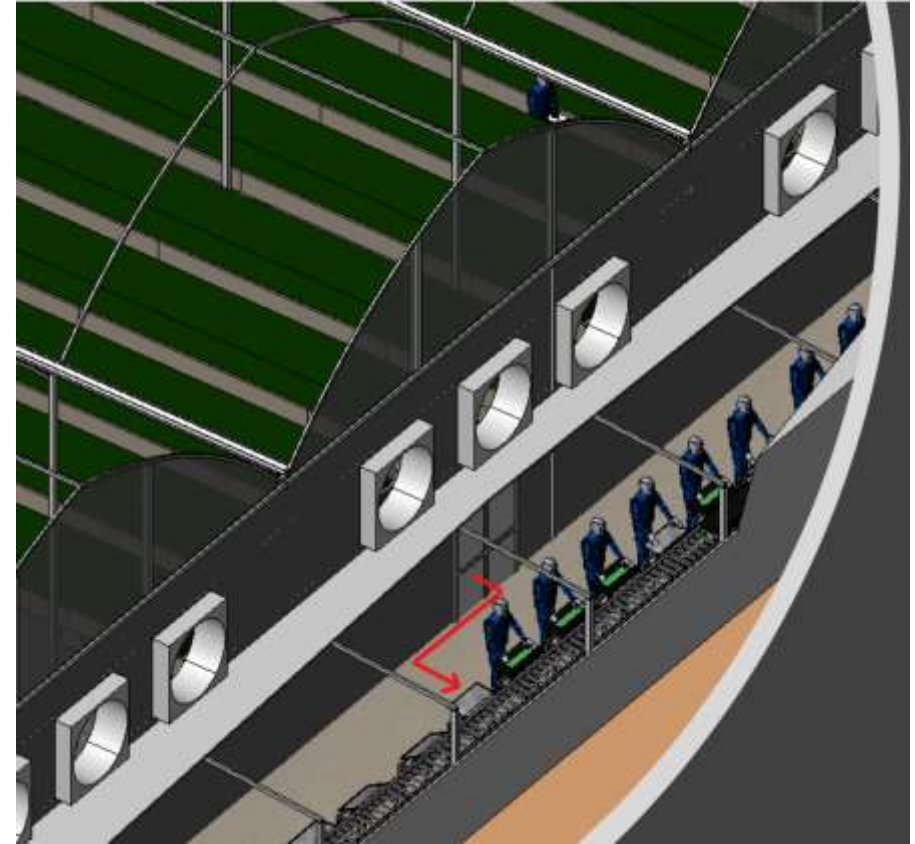
Lean action plan

- Alter mother plant & rooting environment
- More favourable working climate



Lean action plan

- Alter mother plant environment
- More favourable working climate
- Reduce transit time & shock



Reduced unit cost & increased revenue

Faster time into rooting climate = less stress = better rooting and less mortality
= increase rooting % and shortened production time



Lean action plan

- Alter mother plant environment
- More favourable working climate
- Reduce transit time & shock
- Pest & diseases
 - Better hygiene in rooting structures - concrete floors
- Ergonomics
 - Raised beds



Lean action plan

- Alter mother plant environment
- More favourable working climate
- Reduce transit time & shock
- Pest & diseases
 - Better hygiene in rooting structures - concrete floors
- Ergonomics
 - Raised beds
- Stricter quality control
 - More sensors – partition R-camps



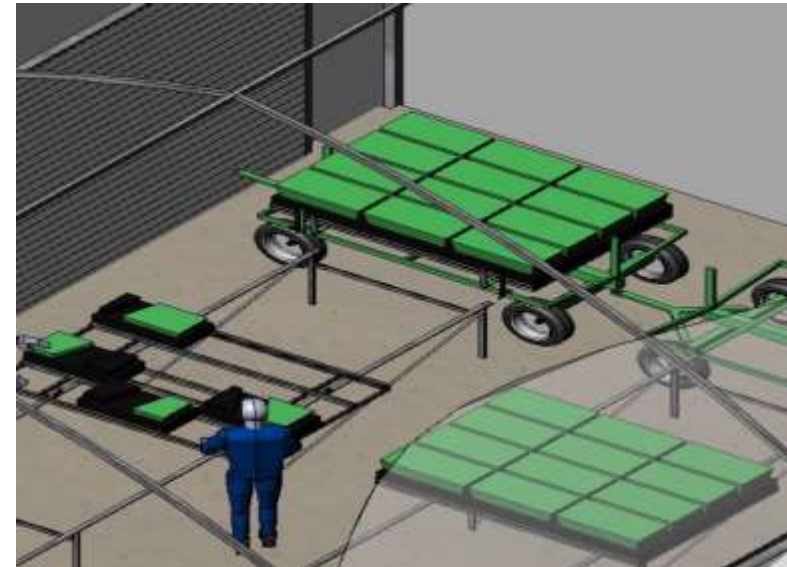
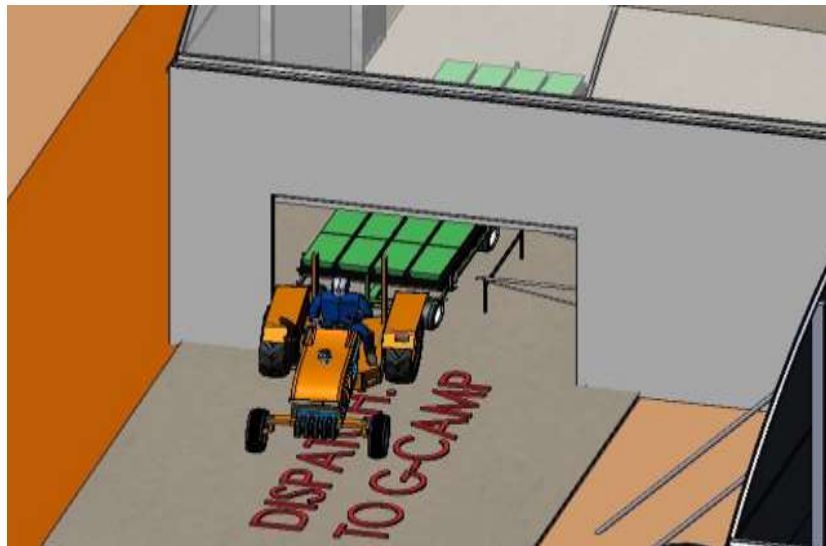
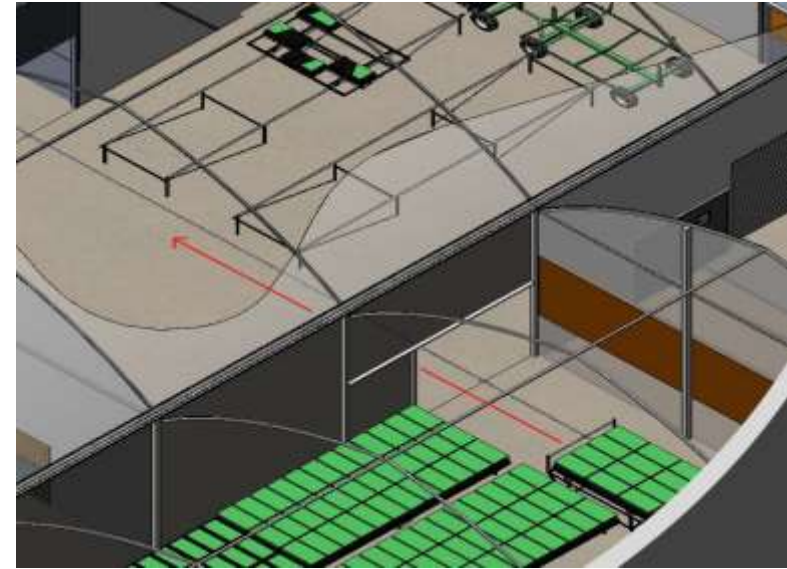
Continued outcomes - sustainability

- Green / reliable energy supply
- Water recycling
- Optimize irrigation systems



Continued outcomes - sustainability

- Sorting area
- Consolidated to full trays
- Graded on size
- Reduce footprint



Escarpment Nursery

- Earthworks commenced - Feb 24
- Construction done by Agrispan
- Completed - Sep 24
- Capacity increased from 3.2 m to 5 m
- Construction
 - PV System
 - Concrete floors in rooting tunnels
 - Grow out tunnels
 - Pumproom
 - Canteen / clinic
 - Electric fence
 - Reservoir



Escarpment Nursery



Ngodwana Nursery

- Refurbishment started in Sep 23
- Completed in Sep 24
- Construction
 - Climate control corridor
 - Conveyor System
 - Pad and fan system
 - New tray sterilization chambers
 - Concrete floors in R - camps
 - Sorting / consolidation area
 - New sowing machine
 - Ellepot trays



Ngodwana Nursery



Richmond Nursery

- Estimated completion - Nov 24
- Severe storm damage - Dec 23
- Construction
 - Germination chambers
 - Tray sterilization chambers
 - Sowing line
 - New G-camp structures
 - Repair storm damaged structures
 - PV System
 - New generator
 - Upgrade water tanks and pumphoom



Clan Nursery

- Refurbishment started - Sep 23
- Completed - Sep 24
- Construction
 - PV System
 - Conveyor System
 - Pad and fan system
 - Concrete floors in R - camps
 - One additional G - camp block
 - Sorting / consolidation area
 - Additional water storage
 - Increased Ellepot production



Clan Nursery





Thank you