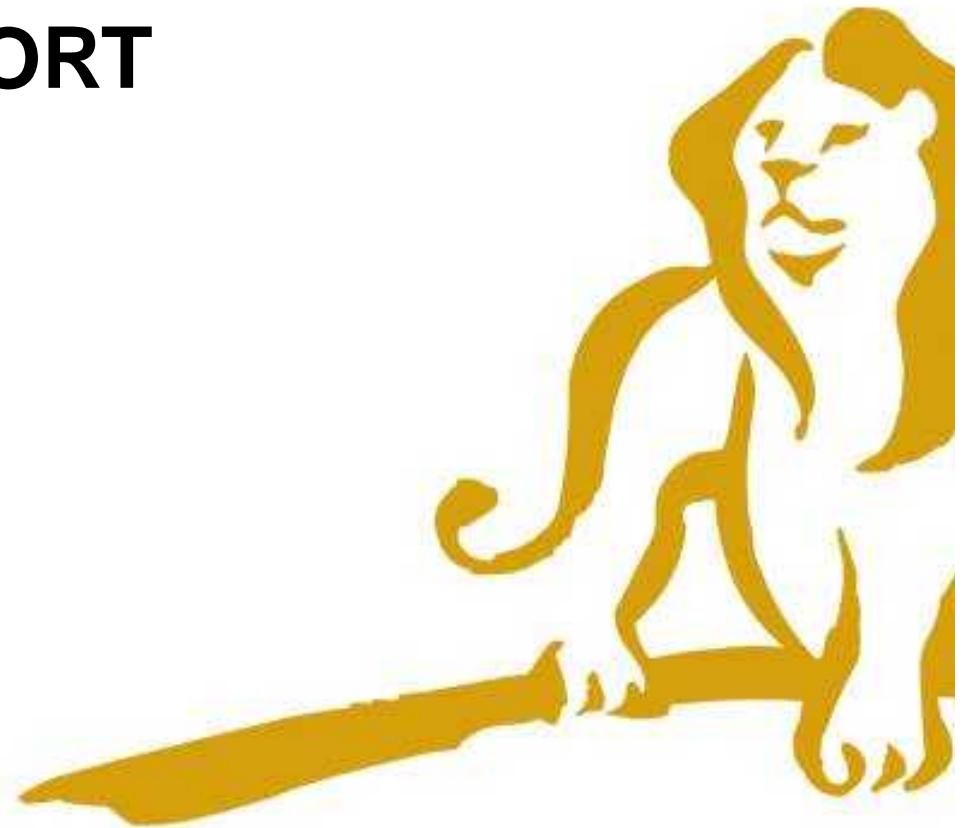
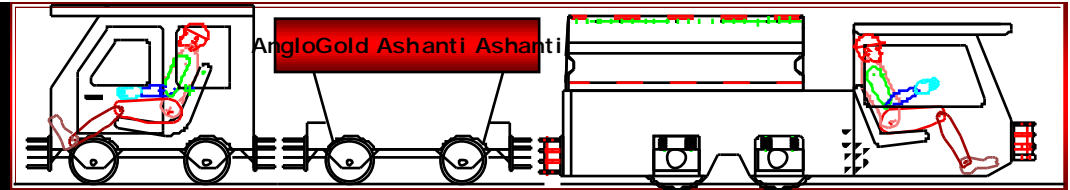


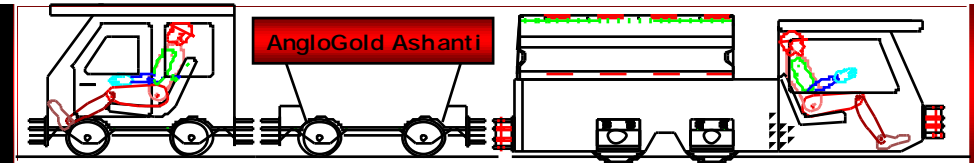
FRONT DRIVEN TRAIN CLOSURE REPORT

NEW ERA LOCO





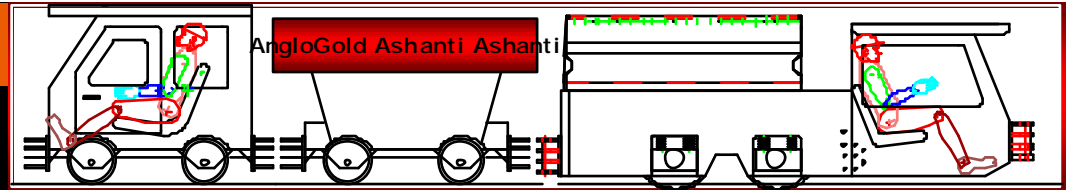
- **Safety – HT results**
- **Whole System Approach**
- **Front Driven Concept Development**
- **Successes within AGA**
- **Future**



Mining locomotives are such an establishment part of underground hard rock mining, *that people take them for granted*, and often don't realize what parameters are important in their:

use, maintenance and selection.

2005 Competition



OVERALL TRANSPORT				
Best Overall Improvement				
	2004	2005	% Var	Pos
KOPANANG	2.85	1.36	-52.3%	1
TAUTONA	3.36	1.62	-51.7%	2
SAVUKA	2.68	1.70	-36.5%	3
MPONENG	0.56	0.42	-24.8%	4
MOAB KHOTSONG	1.73	2.27	31.3%	5
GREAT NOLIGWA	3.05	1.70	-44.2%	6
TAU LEKOA	1.43	1.64	14.9%	7

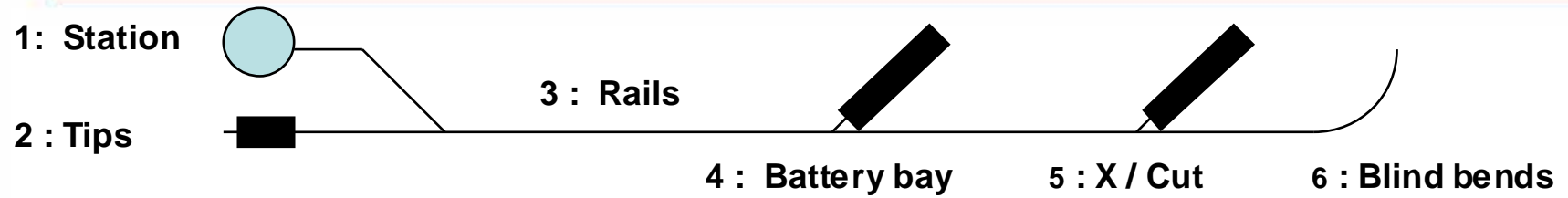
HT Incidents – Injury Classification

Geographical		Operation Name			
Horizontal Transport		All			
		Classification			
		Dressing Case	Lost Time	Serious	Fatal
Years	Quarters	Count Class	Count Class	Count Class	Count Class
2004	Qtr1	93	30	14	1
	Qtr2	102	34	21	1
	Qtr3	101	49	28	
	Qtr4	77	32	24	1
	Total	373	145	87	3
2005	Qtr1	78	30	22	
	Qtr2	76	30	22	
	Qtr3	65	25	18	1
	Qtr4	82	15	7	
	Total	301	100	69	1

Whole System Approach Infrastructure



1 : Station layout / stopping devices

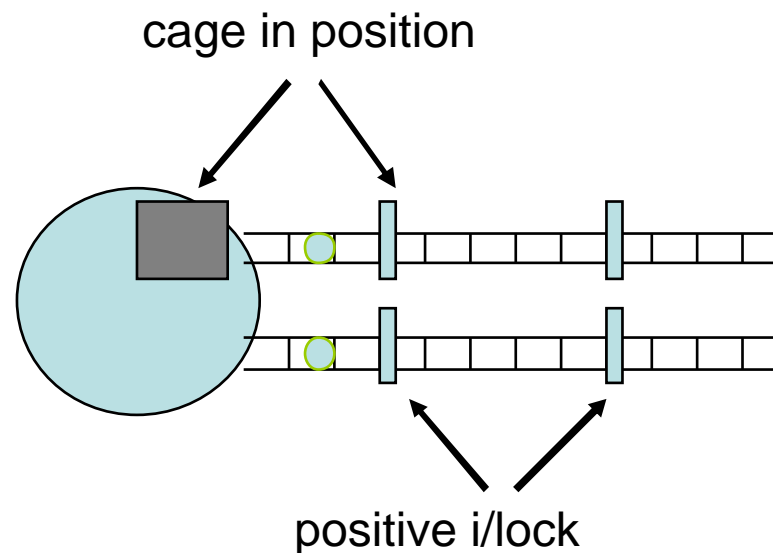


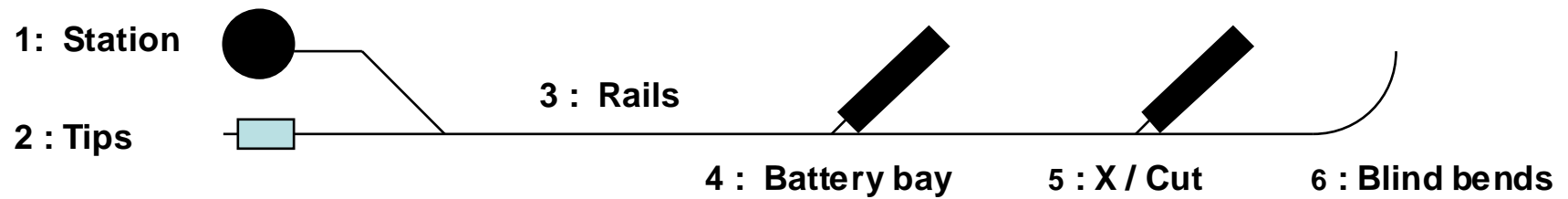
q **VR 2# accident - 1995**

q Risk assessments

q Guideline

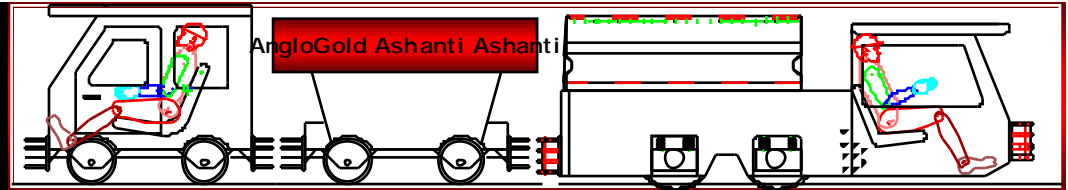
q Audits



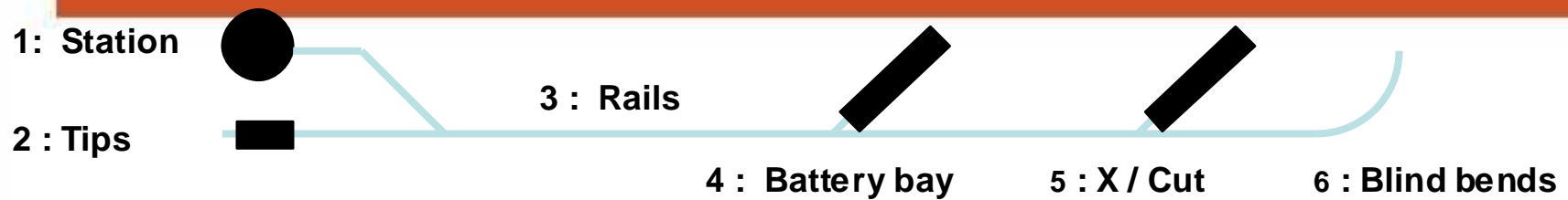


2 : Tips

- q **Barricaded / remote opening**
- q **Dust**
- q **Noise**
- q **Hopper / tip selection**



Infrastructure



3: Rails

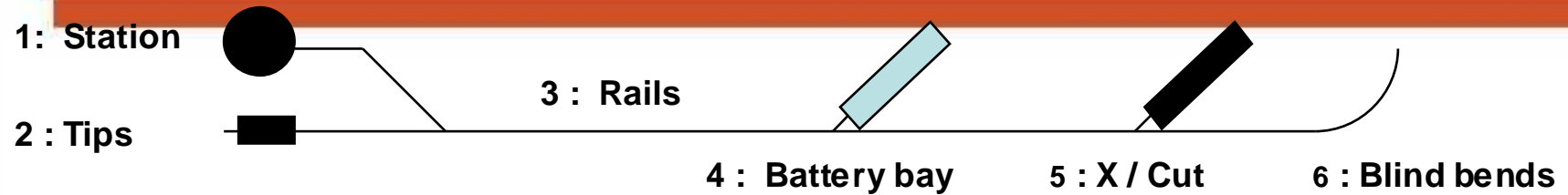
- q Rail specification
- q Water handling
- q Spill – free hoppers
- q Minimise tramming levels
- q Rail / train / clearance



B2

dangers : - derailling, slip & fall, speeding

brobinson, 2001/11/25



4 : Battery bay

- q Racks to cranes
- q Standards...
... & Standards



1 : Station

2 : Tips

3 : Rails

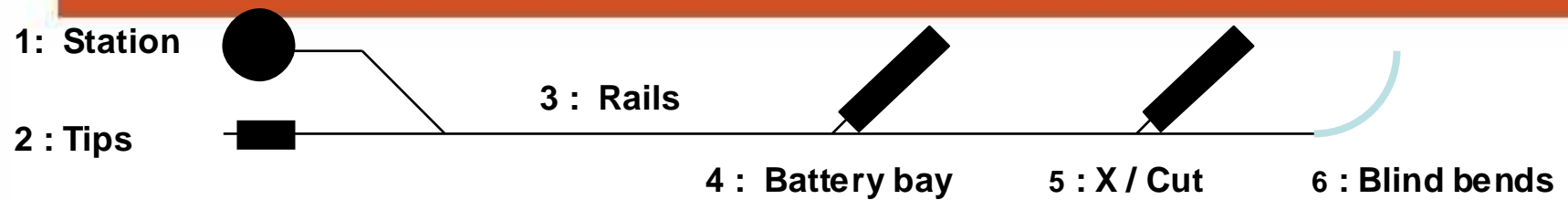
4 : Battery bay

5 : X / Cut

6 : Blind bends

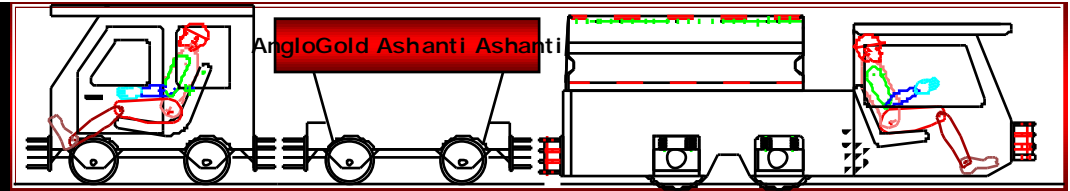
5 : X / cuts

- q Separate rock from men
- q Stacking bays
- q water control (stope & x/cut)
- q hopper size / clearance



6 : Blind bends

- q Traffic control
- q Lighting
- q Noise (e.g. vent fans)
- q Restrictions (e.g. vent doors)
- q Loco pushing blind



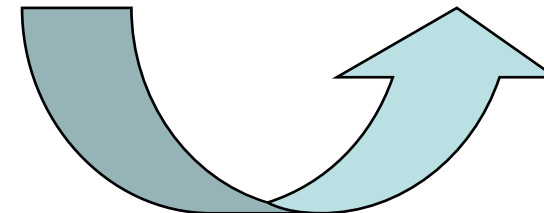
Equipment

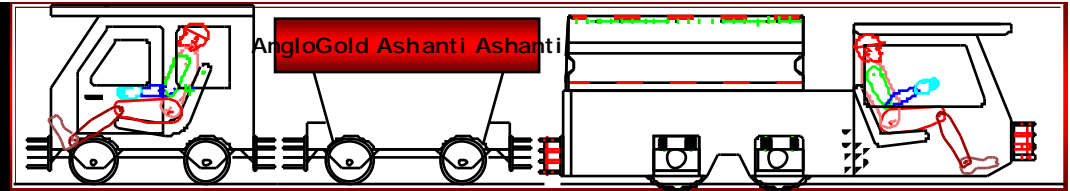
1 : Front driven concept

2 : Communication development

3 : Problems Encountered

- q Enclosed cab
- q Front driven
- q Remote control
- q Hydraulic braking
- q Double reduction gearbox



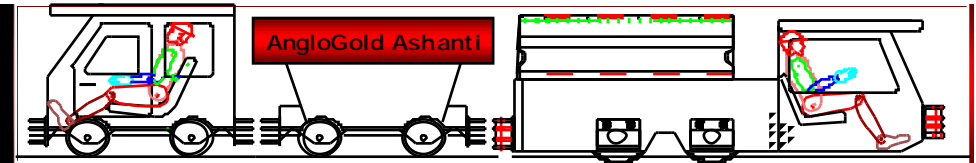


- 1 : Front driven concept
- 3 : Problems Encountered

2 : Communication

- q Proper specification incl. frequency control and remote functionality, transmitter and receiver outputs
- q Replaces pea whistle with electronic unit -interim measure
 - q Audio & visual
 - q In loco's safety circuit
- q Remote control ultimate solution
- q Comm's ratio surface to u/g : 4: 1
- q Rock structure and Faraday cage effect





Equipment

1 : Front driven concept

2 : Communication development

3 : Problems Encountered

4 : Final Stage

qTraining 21st Century worker

qcomplex system – start-up sequence

qfault identification

qmaintaining system

qRadio distance in underground environment

qRadio to controller interface software

qPower to guardcar - sufficient output

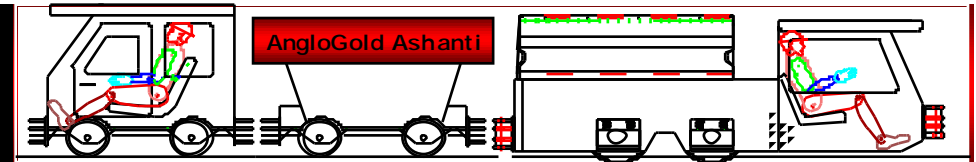
qCharging capacity - short distances

qAlternator drive system

qChain

qAntenna damages - positioning critical

qPump controller failures – Hydraulic pump currents



Equipment

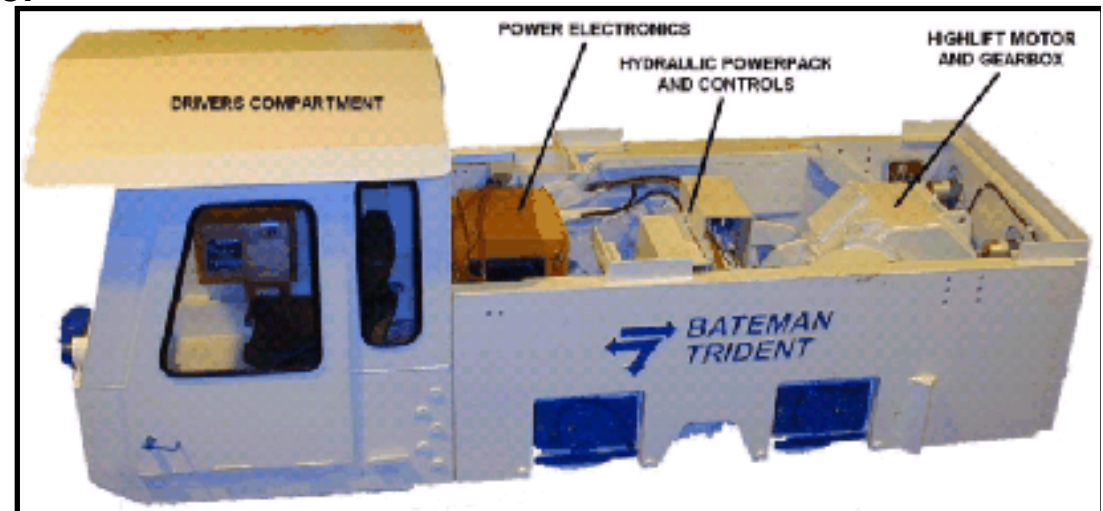
1: Front driven concept

2: Communication development

3: Problems Encountered

4: Final Stage

- **Marketable and fully developed product**
 - Design Freeze
 - Drawings approved
- **Uninterrupted Communication**
 - Software completed
 - Full circuitry diagrams
 - Wiring standards
- **Training for 21 st Century driver**
 - Diagnostics



INFRASTRUCTURE

EQUIPMENT

Fit

PEOPLE

Ergonomics

Risk asst.

Training

Mindset

Integration activities ?

+

=

+

Safety

Legal

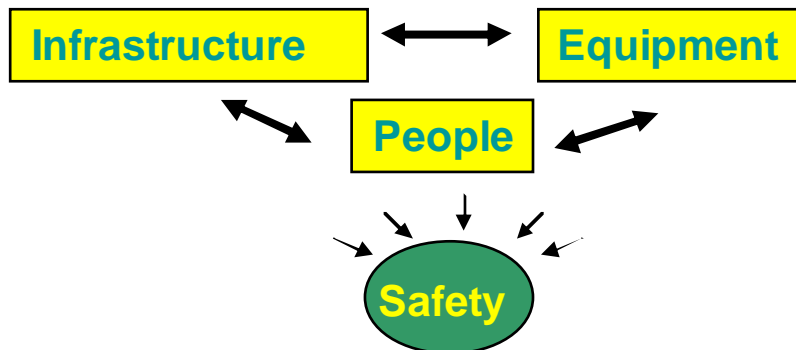
Social

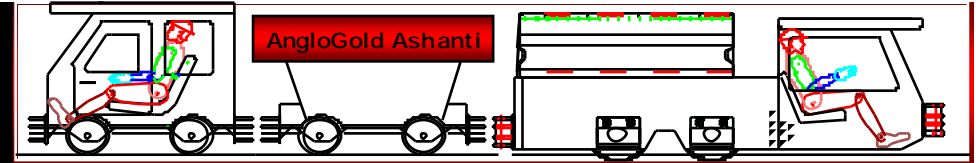
Technology

Economic

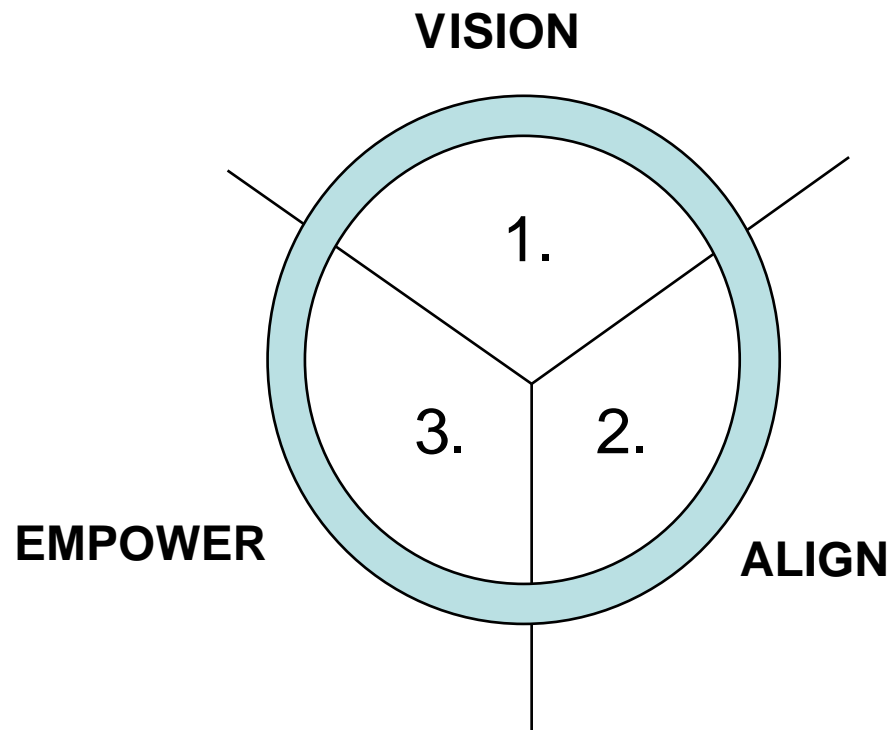
Choices We Made.....

- Organise by process
- Technology program
- HT Safety task teams
- HT Audits
- HT User group





Management in Control



Leadership model – Steven Covey