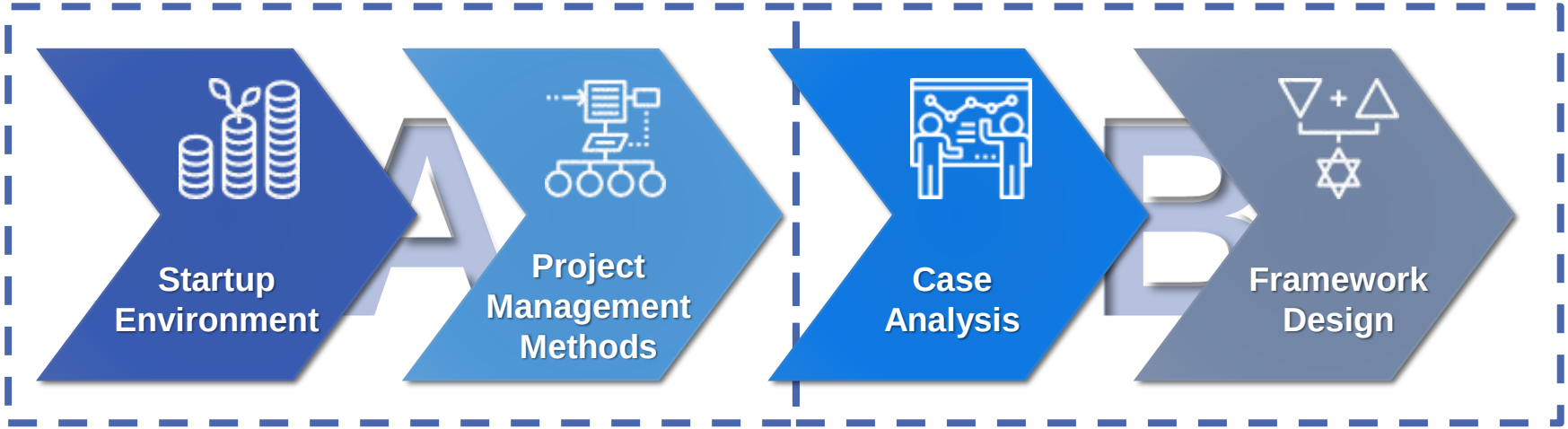
To Develop a Project Management Framework for Taiwan Tech Startup (A)

Presented by Hang-Tien Lin

Supervised by Bruce McCann, Ph.D.

July, 2017

Project Design



The Nature of a Startup

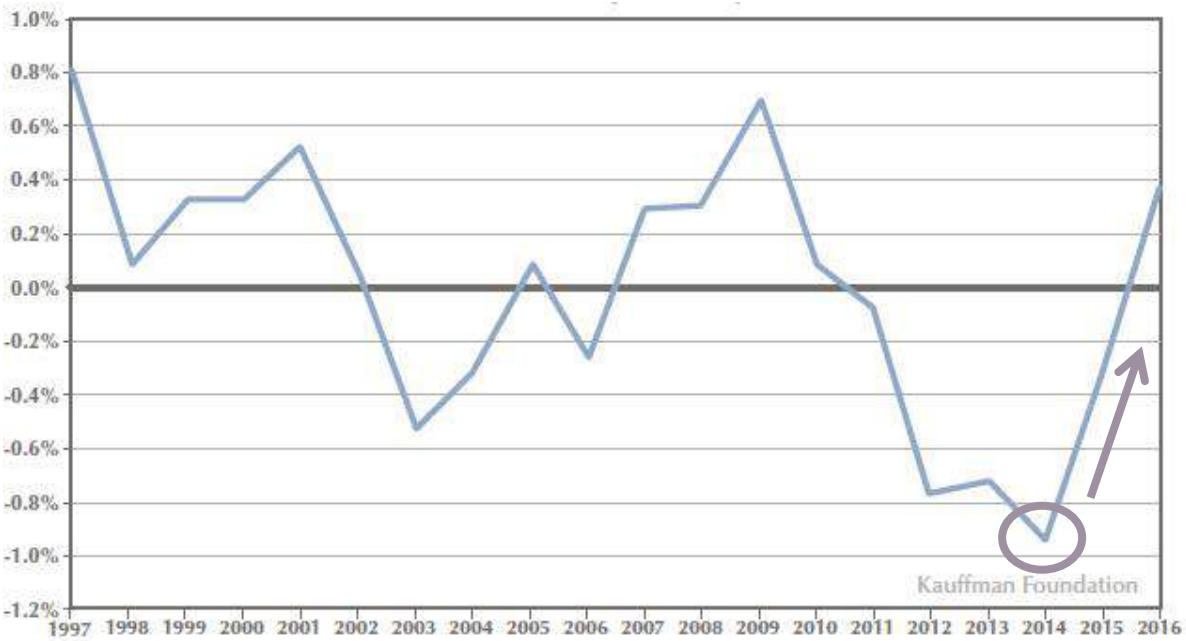
What is a Startup?

Converting ideas into growth and innovation

Developing a sustainable business model

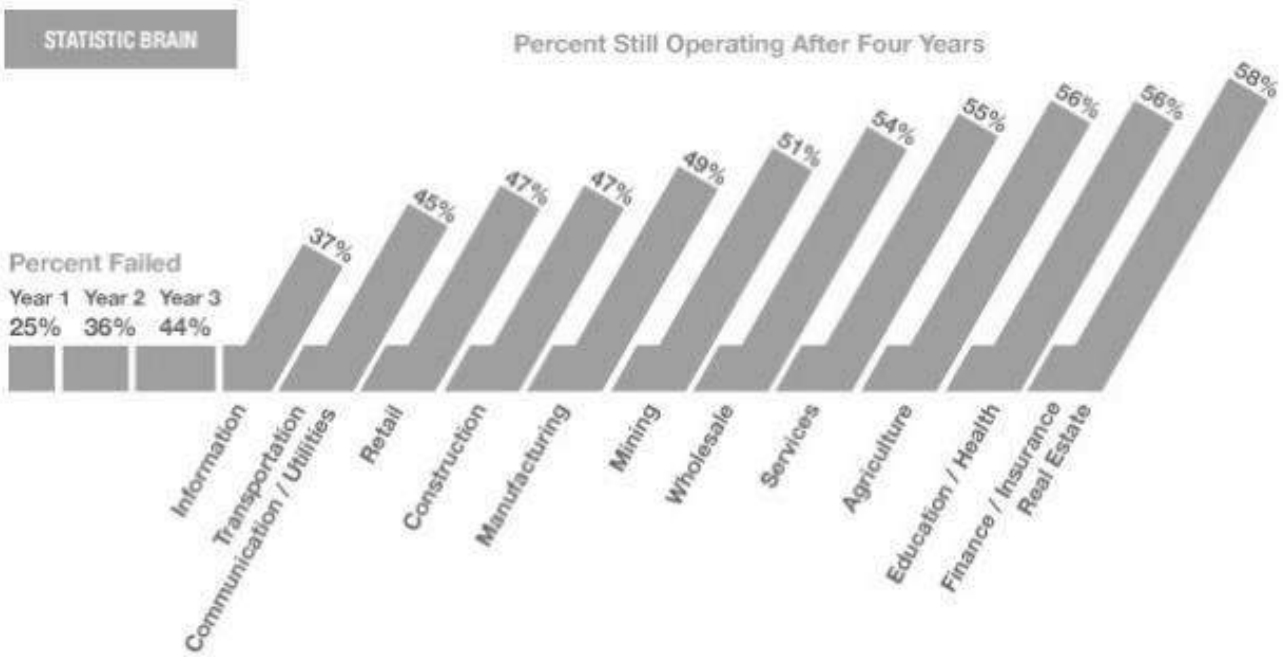
Coping with uncertainty and ambiguity

Startup Activity Trend



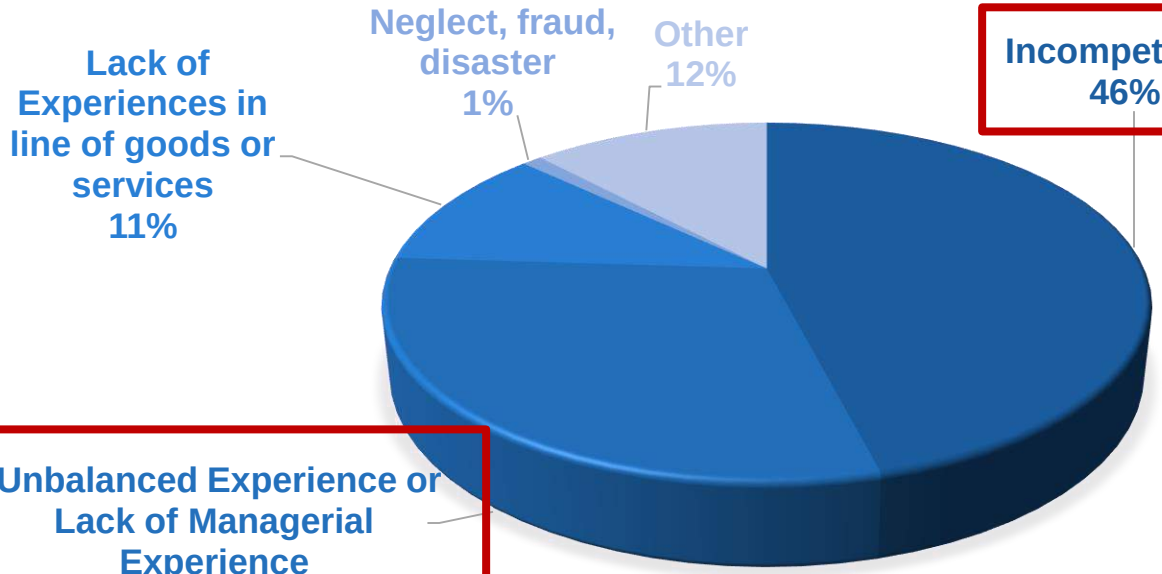
SOURCE: Authors' calculations using the CPS and the BDS. For an interactive version, please see: www.kauffmanindex.org.

Challenges Faced by Startups (1/2)



2017 Statistic Brain Research Institute

Challenges Faced by Startups (2/2)



- Emotional Pricing
- Living too high for the business
- Nonpayment of taxes
- **No knowledge of pricing**
- **Lack of planning**
- No knowledge of financing
- **No experience in record-keeping**

2017 Statistic Brain Research Institute

One Solution for Business Success

97%
Being critical to business performance success

94%
Enabling business growth

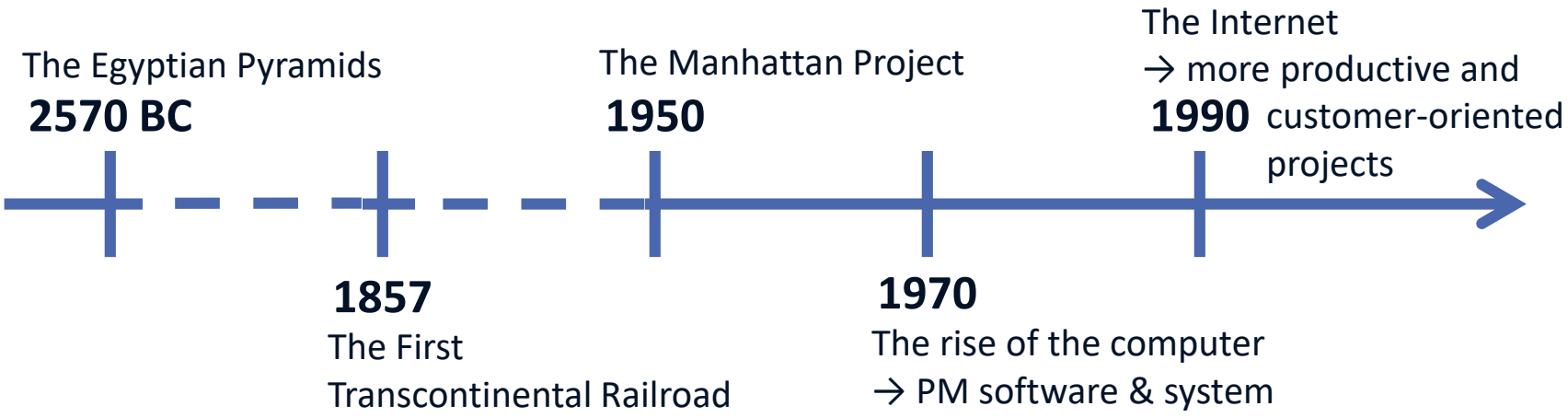
54%
Understanding the value

pwc

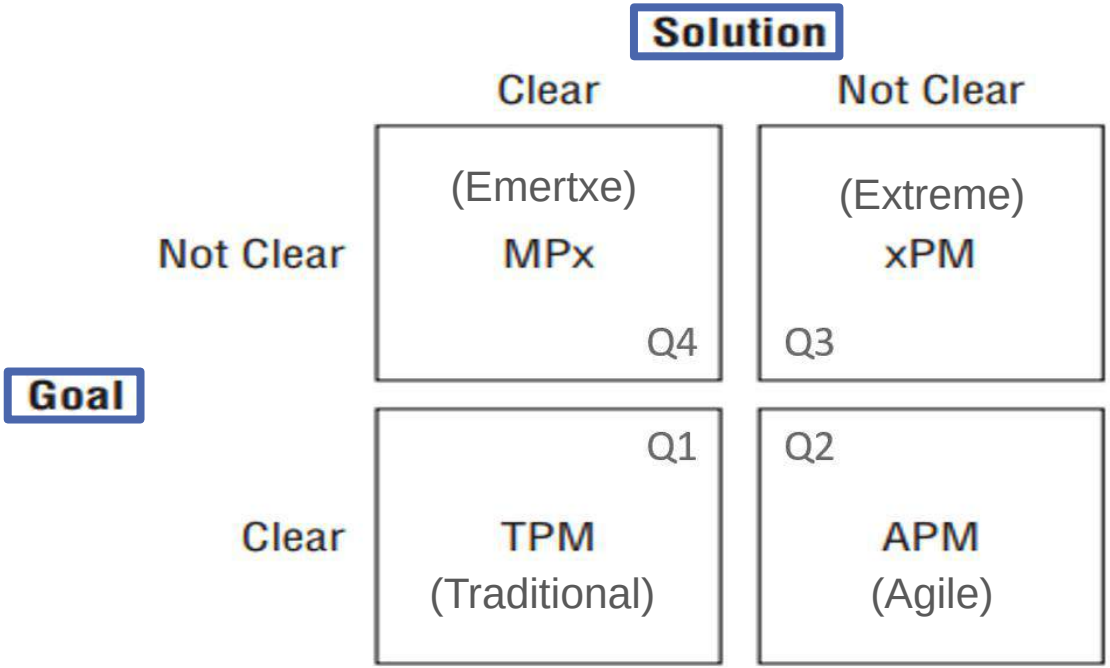
Project Management Origins and Methodologies

Project Management History

"A project is a sequence of unique, complex, and connected activities that have one goal and that must be completed by a specific time, within budget."



The Four Quadrants of the Project Landscape



Source: Wysocki, R.K. (2012). Effective project management. 6th edn. Indianapolis, IN: Wiley.

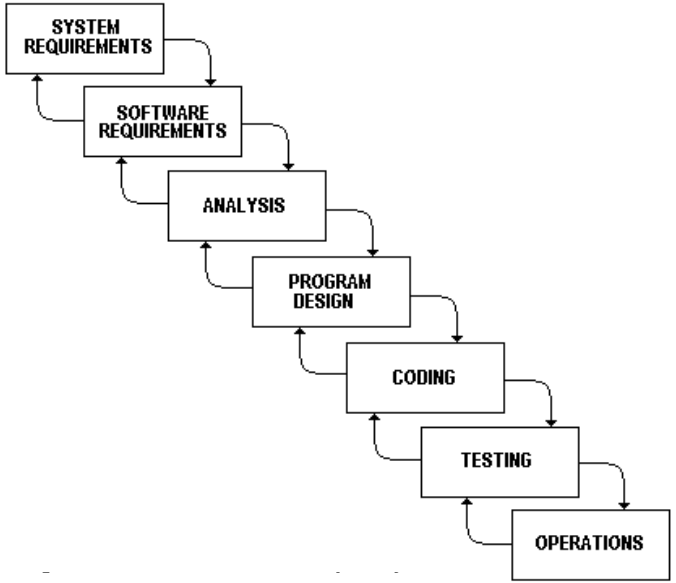
Q1

TPM

Goal: Clear
Solution: Clear

Traditional Project Management

- Step-by-step
- The PMBOK Guide
  - The project life cycle
  - 5 basic process groups
  - 10 knowledge areas
- For startup
  - Checklists
  - Provide the big picture



Source: Royce, Winston (1970). Managing the Development of Large Software Systems. Proceedings of IEEE WESCON, 26 (August): 1–9

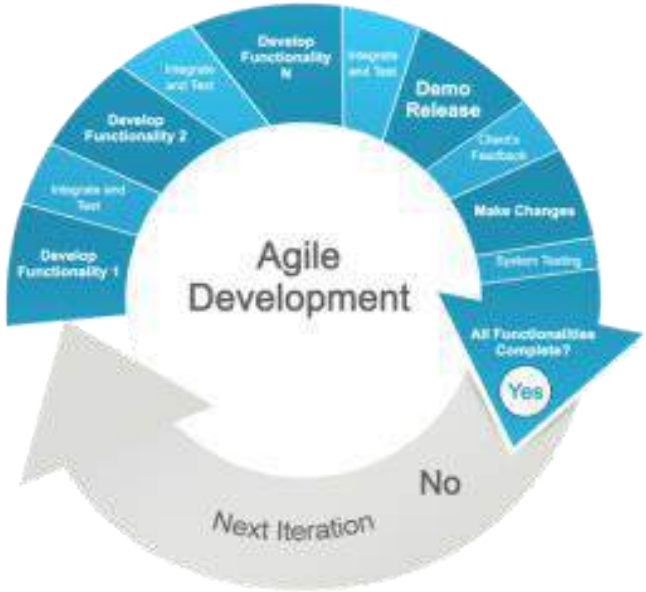
Q2

APM

Agile Project Management

Goal: Clear
Solution: Unclear

- Incremental & iterative
- The Manifesto
  - 4 values
  - 12 principles
- For startup
  - The flexibility to pivot
  - Immediate user feedback
  - High-quality delivery

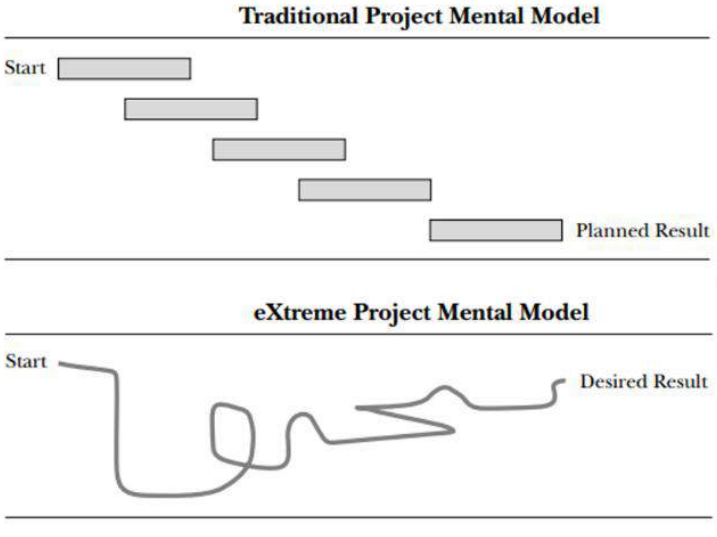


Source: http://techgaia.com/solutions/

Extreme Project Management

Goal: Unclear
Solution: (Not) Clear

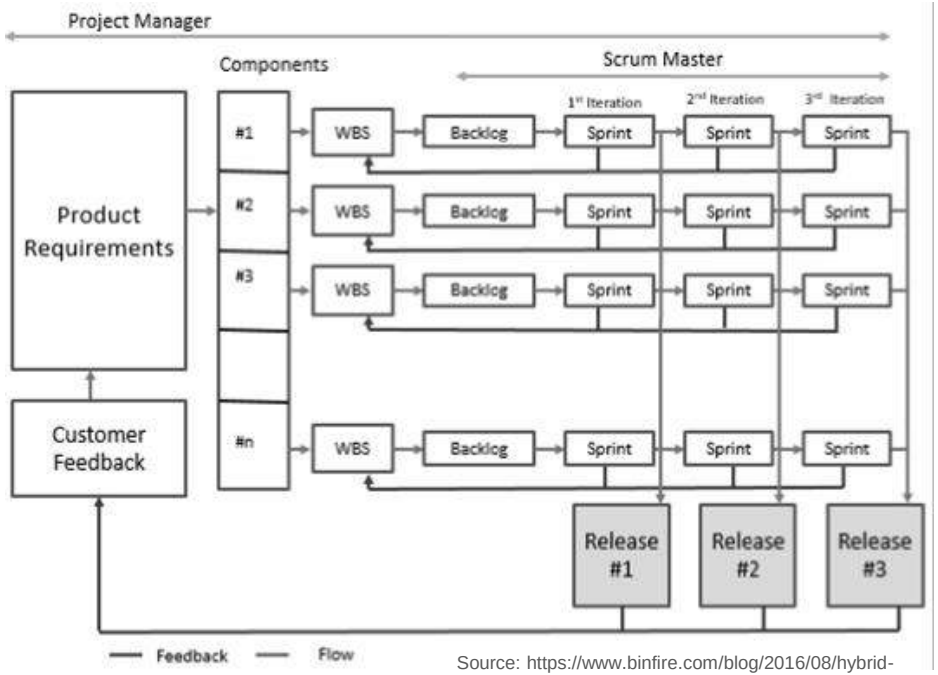
- High-speed & self-correcting
- DeCarlo (2004)
  - 4 principles & business Q.
  - 5 critical factors
  - 10 values
- Emertxe (MPx)
- For startup
  - Just-in-time planning
  - Brevity in scheduling
  - Generating business value



Source: DeCarlo, Doug (2004). eXtreme project management: using leadership, principles, and tools to deliver value in the face of volatility. San Francisco, CA: Jossey-Bass.

Hybrid Project Management

- XPlace* case
  - APM is inadequate when business becomes more complex & bigger
  - TPM doesn't have the flexibility to market changing
  - 25% faster than the old method with fewer bugs and better quality



Source: https://www.binfire.com/blog/2016/08/hybrid-project-management-case-study/

* XPlace is a startup which is innovating and changing the freelance and remote work marketplace.

Conclusion and Future Work

- Solutions and goals are clear → TPM
- Either goal or solution is unclear → APM/XPM
- The most suitable approach for startups

  → a customized management system

Choose my previous work startup as a case study
→ create a project management framework

Q & A

THANKS FOR YOUR LISTENING

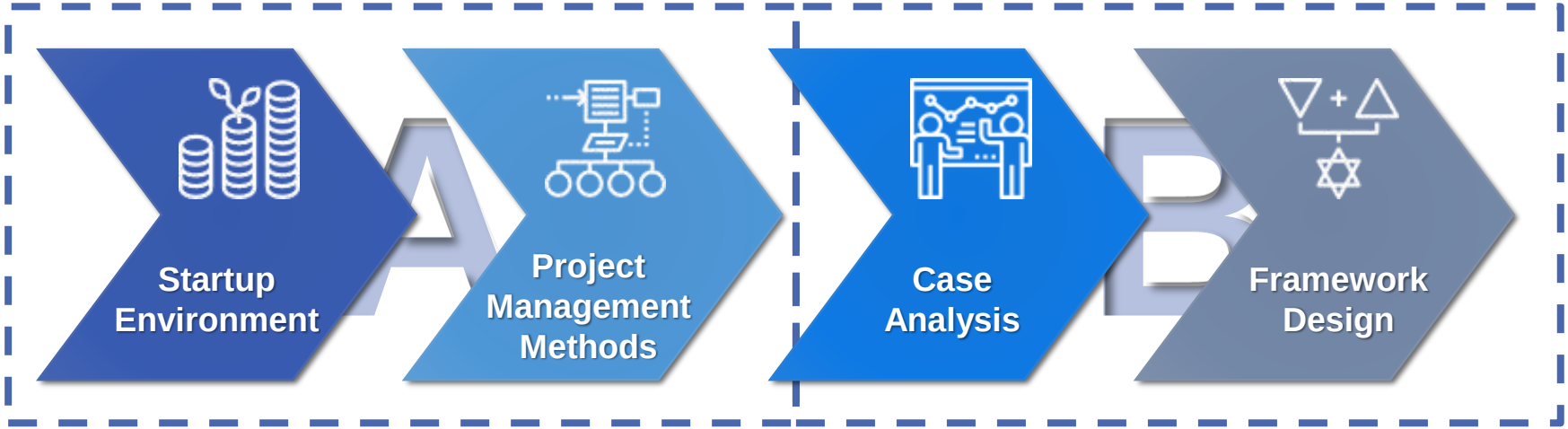
To Develop a Project Management Framework for a Taiwan Tech Startup (B)

Presented by Hang-Tien Lin

Supervised by Bruce McCann, Ph.D.

April, 2018

Project Overview

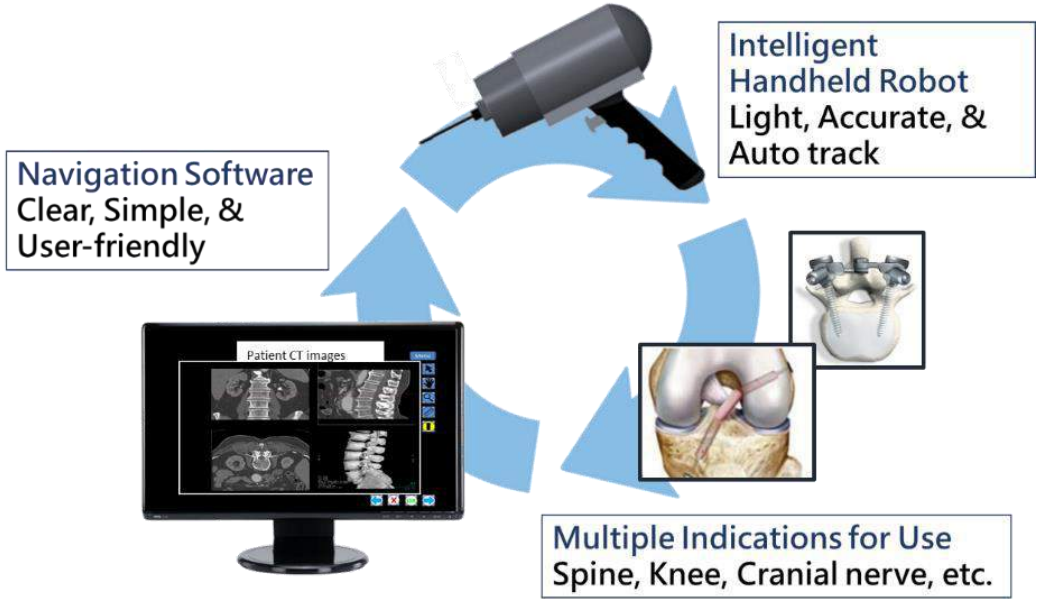


Case study:
RMML startup team

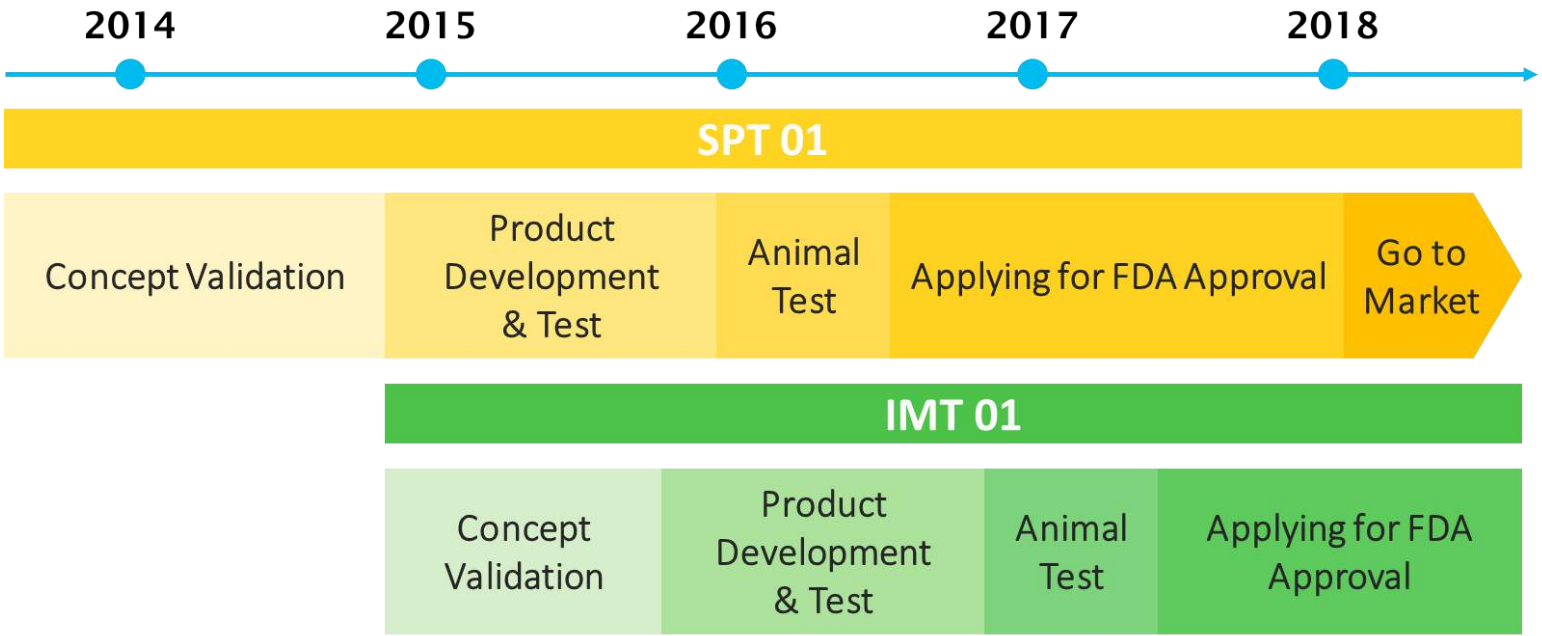
The background of the team

- Grew out of the Robots and Medical Mechatronics Laboratory (RMML) project at National Taiwan University
- The founder: Professor Ping-Lang Yen
- The initial team: 3 researchers and 2 graduated students
- Team founded in May 2014
- Company founded in 2016 & named POINT Robotics

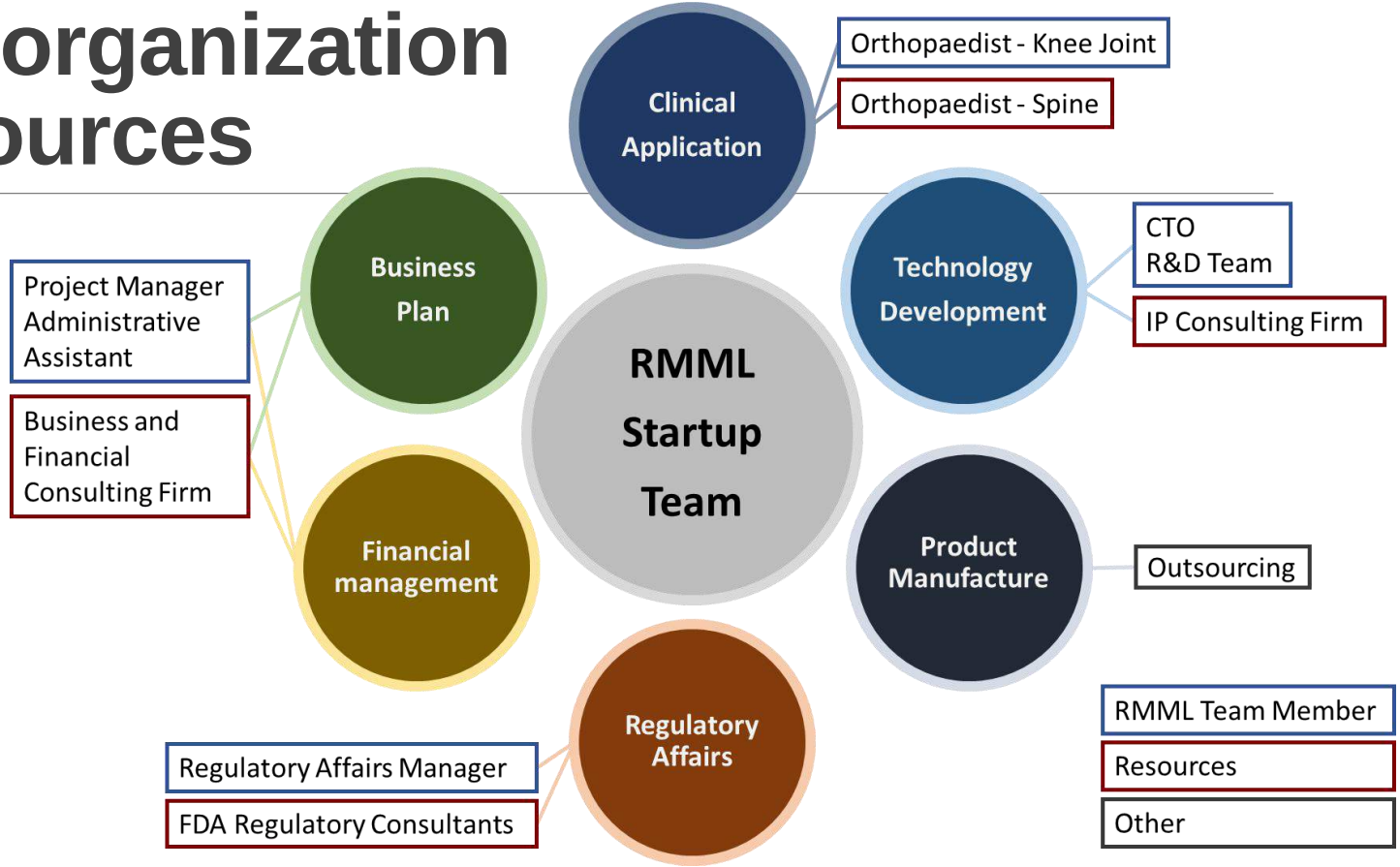
Creating the first product (1/2)



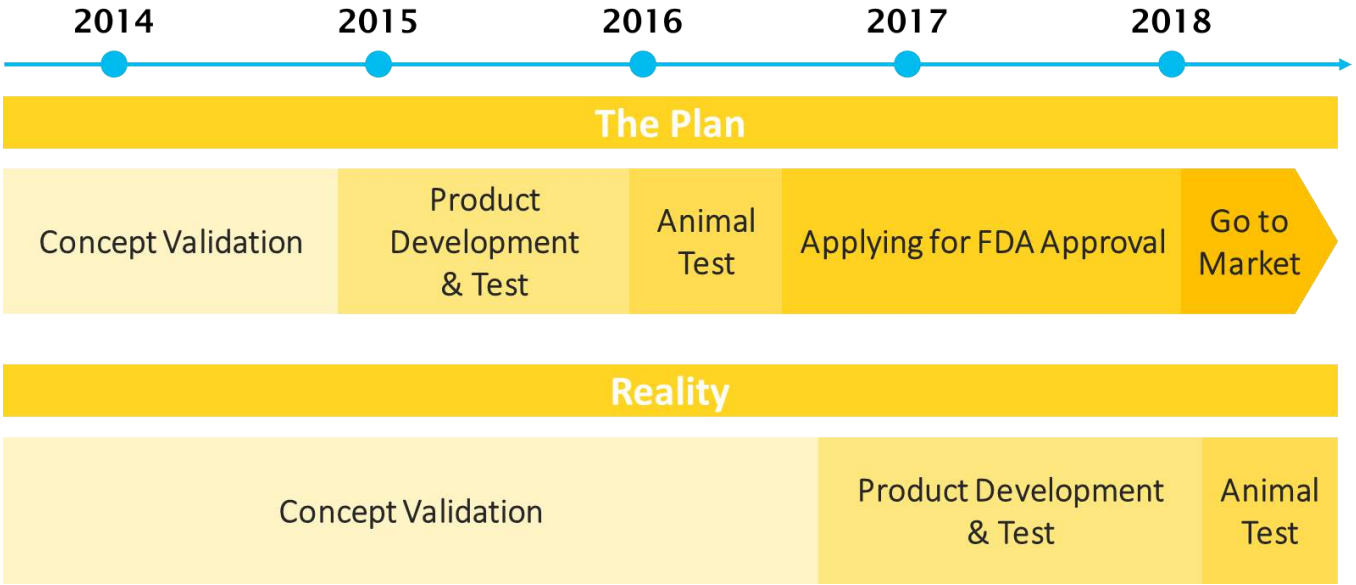
Creating the first product (2/2)



Team organization & resources

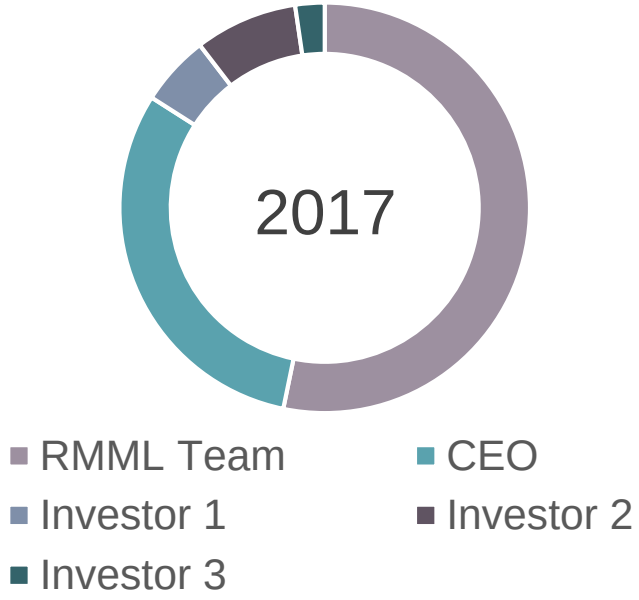


Problem statement (1/3)



Problem statement (2/3)

- Do not have project management process
- Most team members are inexperienced and multitasking
- Gain more resources from external but sacrifice some control power



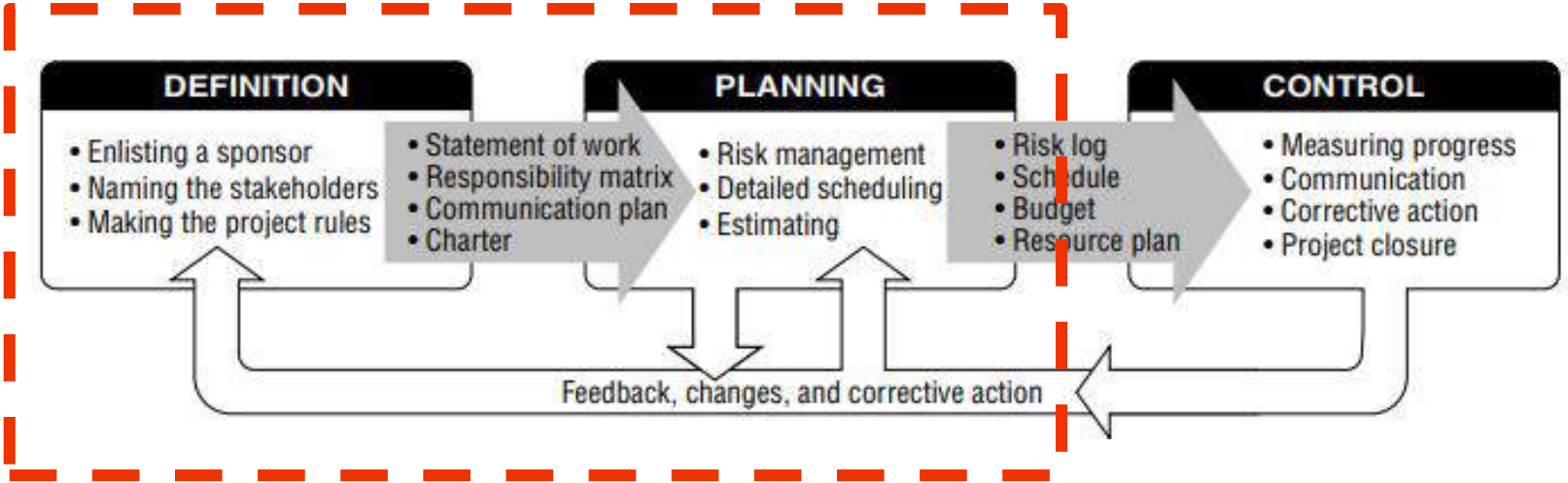
Shareholder Structure

Problem statement (3/3)

- If there is a project plan for the first product development, what the plan will look like?
- The plan may adopt the concept to the future project.

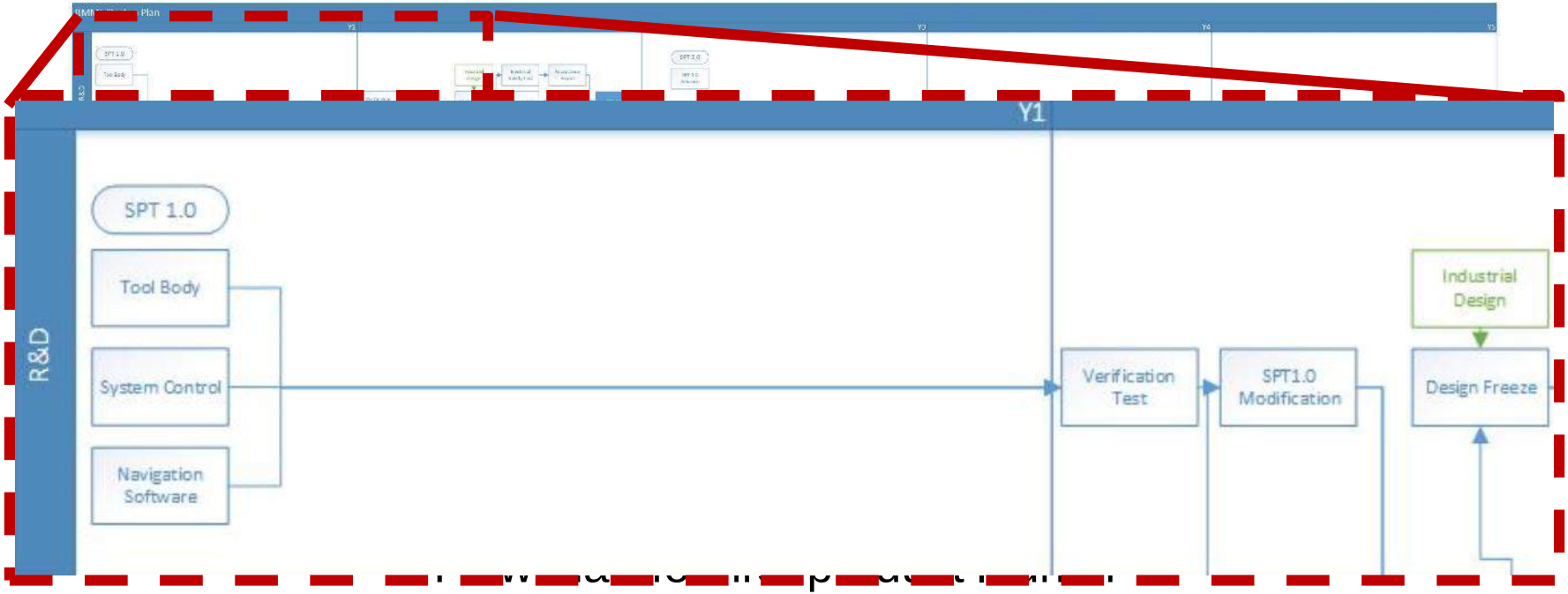
Project plan for the case

Three project management functions



Source: Verzuh, Eric (2016). The fast forward MBA in project management. Hoboken, New Jersey: John Wiley & Sons, Inc

Define the project



Define the project - Project objective statement

Design freeze for an intelligent spinal surgical system and meet the requirements of the animal test in one year at a cost of $1.2 million

Item	Description
Hardware	• Weight < 1Kg • Accuracy < 1mm • Spindle power > 100rpm*15 mNm
Software	• Surgical planning module • Auto alignment function of surgical drill

Define the project - Major milestones

1. Assembling the handheld tool which will reach torque and speed for the drilling of bone
2. Navigation software verification
3. The integration of the software and handheld tool
4. Approval of design and quality from key stakeholders
5. Final review and evaluation of project success

Define the project - IS/IS NOT list

The IS list	The IS NOT list	The MAYBE list
Mechanism and control system design	Profitability assessment	Finding sponsors for expanding resources
Engineering document control	Implementing design controls	Consulting developers of other navigation software
……	……	……

Development

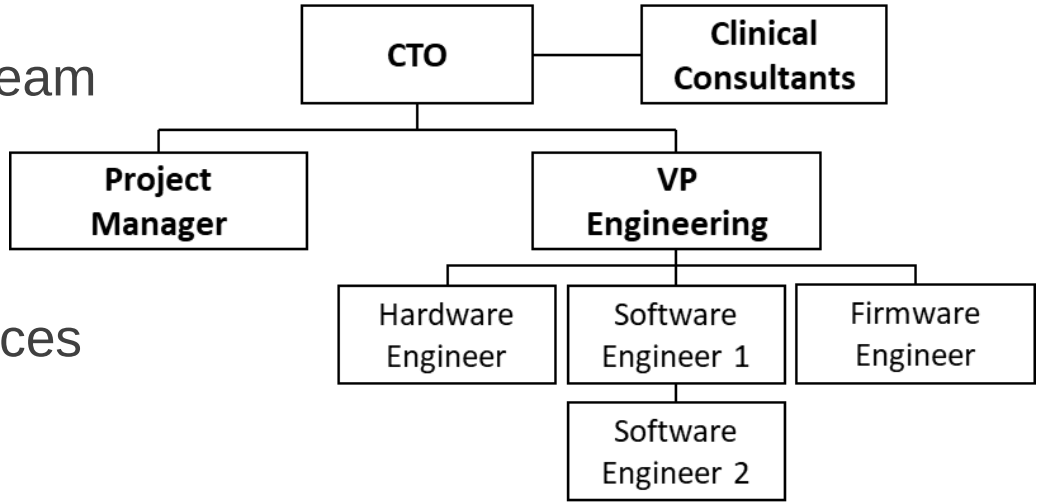
Marketing, regulatory affairs, animal test, & others

Define the project - Major risks list

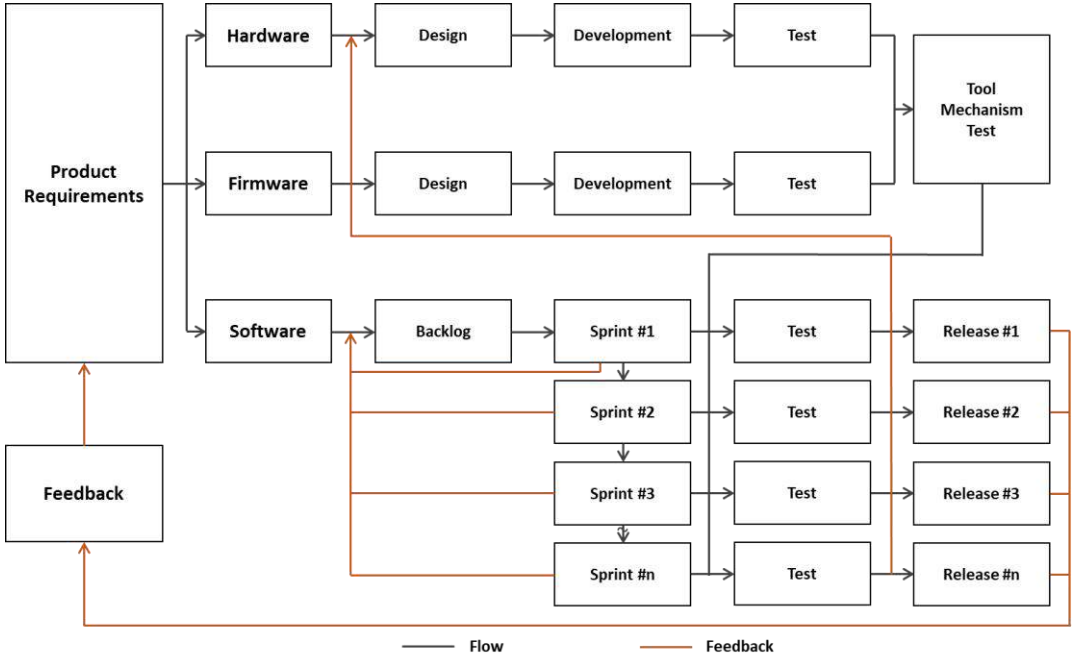
Planning risks	Execution risks	Marketing trend risks
Failure of defining the project objective and scope	Lack of competent resources or personnel issues	Moving targets on regulations
Missing tasks in the planning and milestones	Delays with mechanical component outsourcing or procuring items for design use	New technologies or new competitors' product launches
……	……	……

Define the project – RMML organizational structure

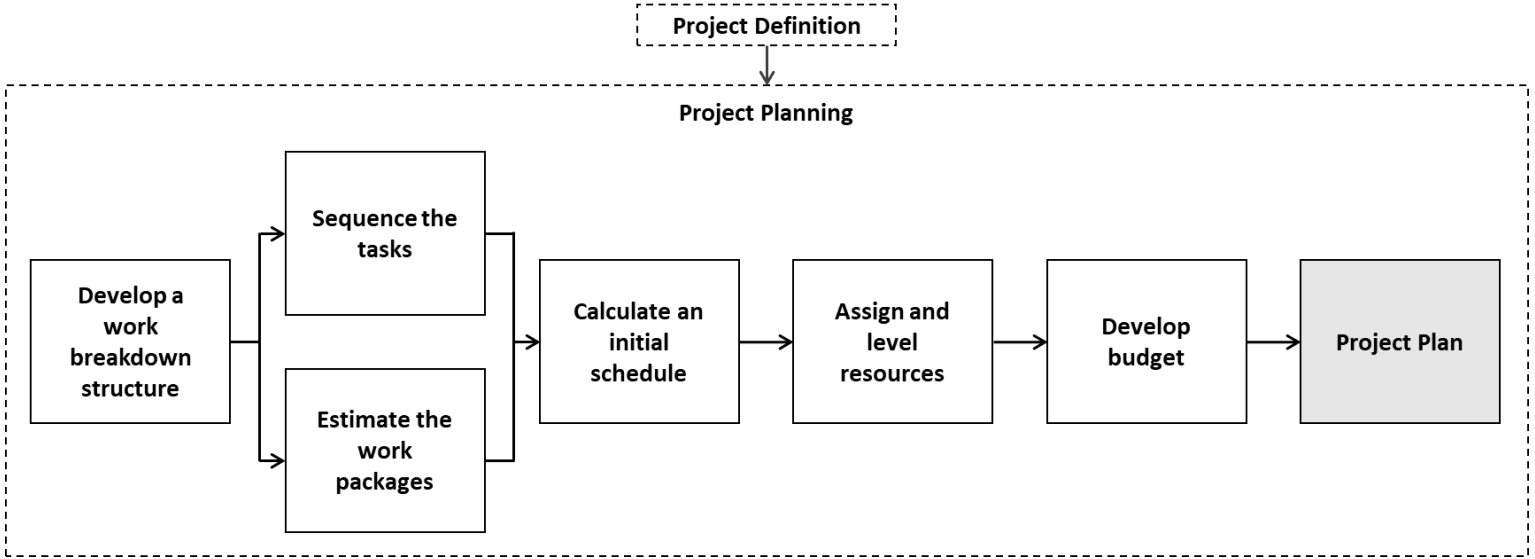
1. Let CTO decide the product pipeline directly and quickly
2. The engineering team is designed as a functional team
   - Specialization
   - Operational speed
   - Efficient use of resources



Define the project – Project framework



Plan the project



Conclusion

- Develop management skills and use effective PM approaches to improve startup successful rates
- Define the project → get the team on the same page
- Plan the project → allocate resources and monitor the schedule
- A good chance to put knowledge into practice with a real case study

Q & A

THANKS FOR YOUR LISTENING

Work breakdown structure

Project: Design freeze for an intelligent spinal surgical system

1.0 Define requirements and design process

- 1.1 Review project definition
- 1.2 Understand user context
  - 1.2.1 Understand spinal surgery process
  - 1.2.2 Compare system functions of competitors
- 1.3 Design system
  - 1.3.1 Design Handheld tool
  - 1.3.2 Design navigation software

2.0 Develop a handheld tool

- 2.1 Develop hardware
  - 2.1.1 Design and make mechanical components
  - 2.1.2 Select electric motors and reducers
  - 2.1.3 Assemble the components
- 2.2 Develop firmware
  - 2.2.1 Select motor drivers
  - 2.2.2 Order and test the intelligent motion control platform
  - 2.2.3 Design and make electric control boxes
  - 2.2.4 Design firmware architecture

3.0 Develop navigation software

- 3.1 Confirm flowchart for software
- 3.2 Build a simple version for tool mechanism test
- 3.3 Design human machine interface
- 3.4 Establish an image registration approach
- 3.5 Develop an algorithm for improving accuracy
- 3.6 Software verifications

4.0 Integrate and test tool mechanism

- 4.1 Integrate hardware and firmware parts as the handheld tool
- 4.2 Test the tool mechanism

5.0 Integrate and test system

- 5.1 Integrate the tool and software as the whole system
- 5.2 Test the system

A work package template

Project name:		Project manager:
WP name:	WBS code:	WP owner:
Objectives:		
Input deliverable(s):		
Output deliverable(s):		
Resources required:		

Labor		Other resources		
Type	Labor days	Item	Quantity	Cost

Acceptance test:	
Date approved:	Number of working days required:
Possible risk events:	
Meeting records:	

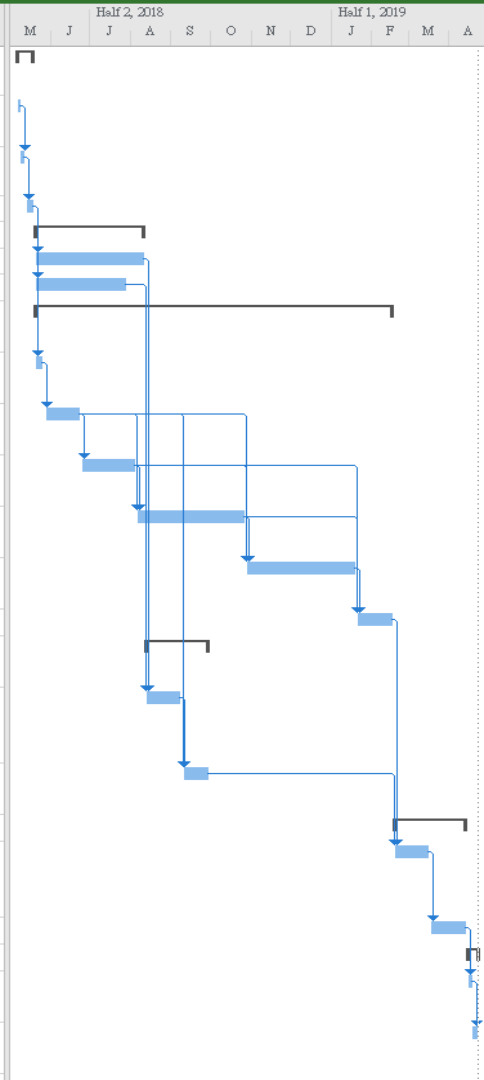
Linear Responsibility Chart

A: Approval P: Prime Responsibility R: Review N: Notification O: Output I: Input B: Initiation

Activity	CTO	Project Manager	Head of Engineering	Engineer	Clinical Consultant	Regulatory Affairs Manager
Defining project meetings and schedules	R	B, P, O	R	N	-	R
Personnel training	N	-	B, P	-	-	-
Understanding surgical processes and product plan	A	P, O	I	-	I	R
Confirmations of materials of mechanical components and specifications	R	N	A	P, O	-	N
Engineering document control	R	P, O	A	I	-	R
Patenting methods	P, I, A	-	I, O	I	-	-
Mechanism and control system design	R	N	P, A	O	-	N
Navigation software and human machine interface design	R	N	P, A	O	-	N
Installation of handheld tool	R	N	P, A	O	-	R
Compatibility test	R	N	P, A	O	R	N
Design freeze	A	R	P, O	I	N	R

Gantt chart template

Task Name	Duration	Start	Finish	Predecessors
1.0 Define requirements and design process	**10 days**	**Mon 5/7/18**	**Fri 5/18/18**	
1.1 Review project definition	2 days	Mon 5/7/18	Tue 5/8/18	
1.2 Understand user context	3 days	Wed 5/9/18	Fri 5/11/18	2
1.3 Design system	5 days	Mon 5/14/18	Fri 5/18/18	3
2.0 Develop a handheld tool	**60 days**	**Mon 5/21/18**	**Fri 8/10/18**	
2.1 Develop hardware	60 days	Mon 5/21/18	Fri 8/10/18	4
2.2 Develop firmware	50 days	Mon 5/21/18	Fri 7/27/18	4
3.0 Develop navigation software	**195 days**	**Mon 5/21/18**	**Fri 2/15/19**	
3.1 Confirm flowchart for software	5 days	Mon 5/21/18	Fri 5/25/18	4
3.2 Build a simple version for tool mechanism test	20 days	Mon 5/28/18	Fri 6/22/18	9
3.3 Design human machine interface	30 days	Mon 6/25/18	Fri 8/3/18	10
3.4 Establish an image registration approach	60 days	Mon 8/6/18	Fri 10/26/18	10,11
3.5 Develop an algorithm for improving accuracy	60 days	Mon 10/29/18	Fri 1/18/19	10,11,12
3.6 Software verifications	20 days	Mon 1/21/19	Fri 2/15/19	11,12,13
4.0 Integrate and test tool mechanism	**35 days**	**Mon 8/13/18**	**Fri 9/28/18**	
4.1 Integrate hardware and firmware parts as the handheld tool	20 days	Mon 8/13/18	Fri 9/7/18	6,7
4.2 Test the tool mechanism	15 days	Mon 9/10/18	Fri 9/28/18	10,16
5.0 Integrate and test system	**40 days**	**Mon 2/18/19**	**Fri 4/12/19**	
5.1 Integrate the tool and software as the whole system	20 days	Mon 2/18/19	Fri 3/15/19	14,17
5.2 Test the system	20 days	Mon 3/18/19	Fri 4/12/19	19
6.0 Design Freeze	**6 days**	**Mon 4/15/19**	**Mon 4/22/19**	
6.1 Approval of design and quality from stakeholders	3 days	Mon 4/15/19	Wed 4/17/19	20
6.2 Final review and evaluation	3 days	Thu 4/18/19	Mon 4/22/19	22



A risk log template

Project name:					Project manager:	
Risk ID	Priority	WBS code	Responsible person	Description	Strategy	Current Status