Evaluating technology acquisitions

Technology acquisitions and partnerships

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UNIVERSITY OF CAMBRIDGE
Department of Engineering

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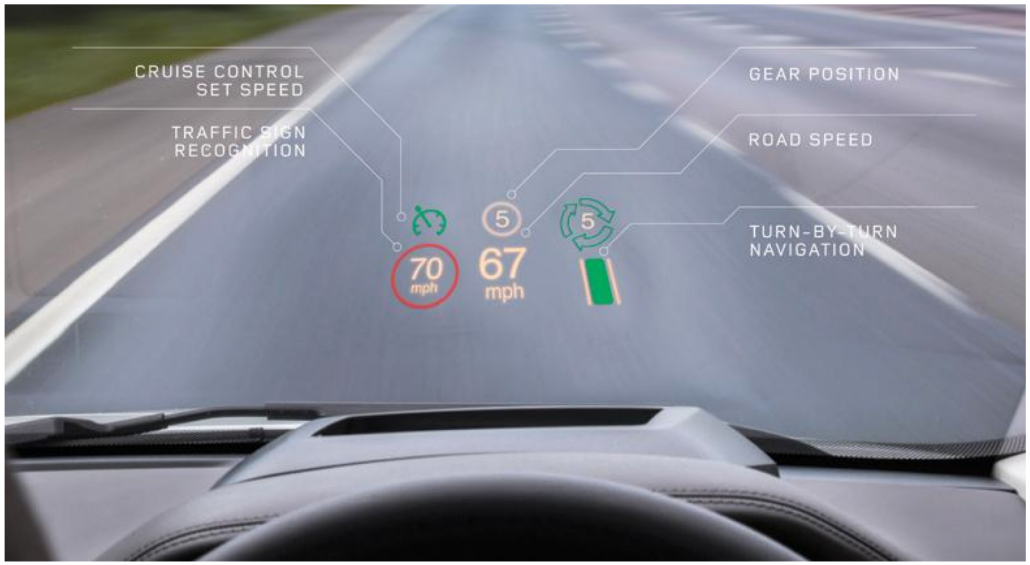
Agenda

- Introduction
- Why technology acquisitions and partnerships?
- Technology acquisition evaluation – **What?, Why?** & **How?**
  - Acquisition evaluation activity
- Discussion and feedback
- Close

Department of Engineering



Holographic HUD developed in Cambridge, adopted by Jaguar LandRover

6 Divisions in the department

Energy, Fluid Mechanics and Turbomachinery

Electrical Engineering

Mechanics, Materials and Design

Civil Engineering

Manufacturing and Management

Information Engineering

Institute for Manufacturing (IfM) (Manufacturing and Management Division)

Research Groups

Asset Management

Design Management

Distributed Automation & Information Lab

Industrial Photonics

Industrial Sustainability

Inkjet Research

Nano Manufacturing

Science, Technology & Innovation Policy

Strategy & Performance

Service Alliance

Technology Management

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Institute for Manufacturing

Why technology acquisitions and partnerships?

Why technology acquisitions and partnerships? – in the context of digital transformation

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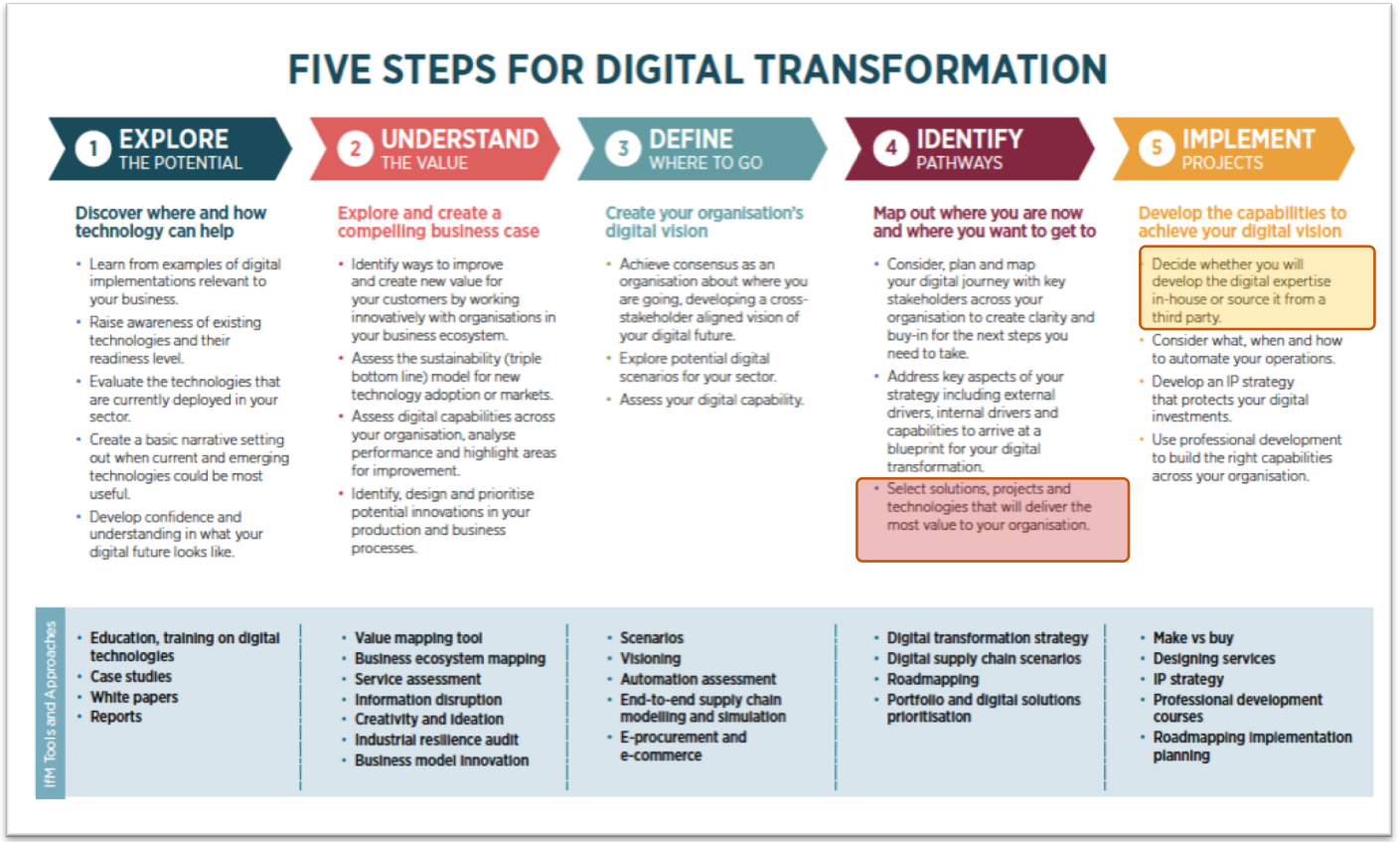
Why technology acquisitions and partnerships? – in the context of digital transformation



Identify pathways

Select solutions, projects and technologies that will deliver the most value to your organisation

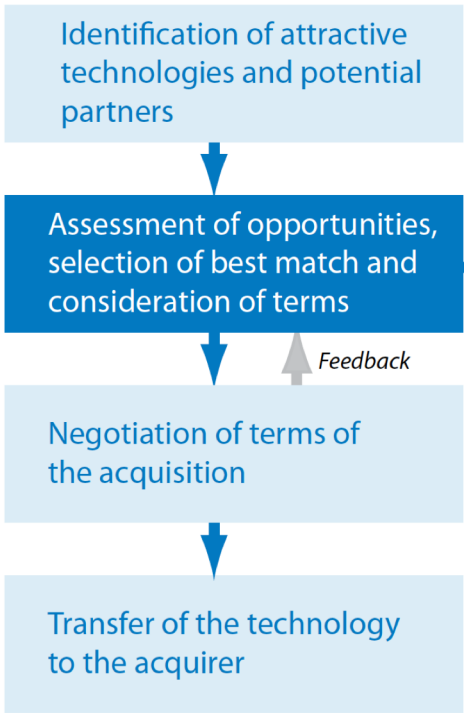
Implement

Decide whether you will ***develop the digital expertise [incl. technology] in-house or source it from a third party***

If third party,

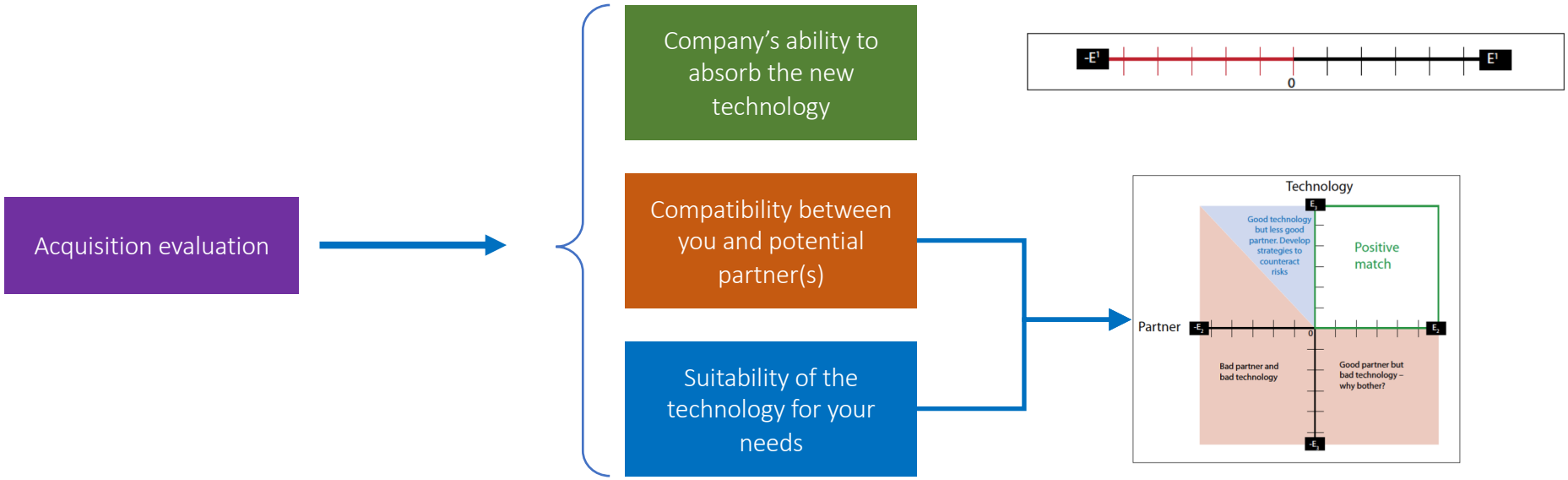
- *what exactly, and*
- *from whom?*

Steps in technology acquisition



The technology acquisition process
Source: Mortara & Ford (2012)

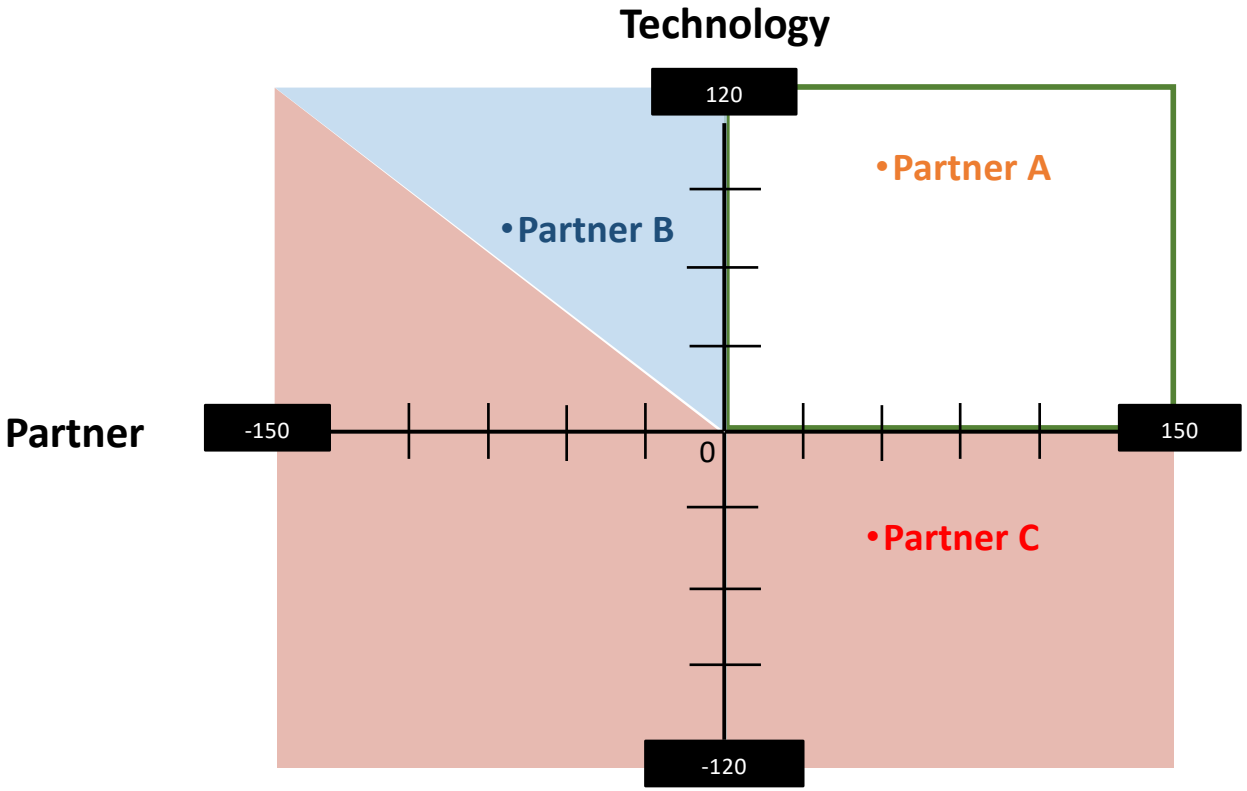
Acquisition evaluation



Source: Mortara & Ford (2012)

Why acquisition evaluation?

- More explicit and structured consideration/assessment of potential suppliers or partners



Acquisition evaluation
1. Your ability to absorb the new technology

A_1: Factors	B_1: Importance 1-10	C_1: Scoring							D_1: Final score = B x C
		Low			Average			High	
Our level of technical knowledge related to this technology	7	-3	-2	(-1)	0	1	2	3	-7
Our level of technological knowledge and expertise in acquiring technology	6	-3	-2	-1	0	(1)	2	3	6
Our level of internal support for the acquired technology	8	-3	-2	-1	0	1	(2)	3	16
Our capability to apply technology in new products	5	-3	-2	-1	(0)	1	2	3	0
Our capability to exploit and reuse technological knowledge acquired from the external world	8	-3	-2	-1	0	1	2	(3)	24
								Total D_1=	39

Any negative scores require review

Source: Mortara & Ford (2012)

Acquisition evaluation
2. Compatibility between you and your potential partner(s)

A_2: Factors	B_2: Importance 1-10	C_2: Scoring							D_2: Final score = B x C
		Low			Average			High	
Previous knowledge of partner	8	-3	-2	-1	0	1	2	3	-16
Market acceptance of the alliance (e.g. customers, competitors and government)	5	-3	-2	-1	0	1	2	3	5
Partner technical capability	9	-3	-2	-1	0	1	2	3	18
Partner working style compatibility (e.g. flexibility, trustworthiness, project delivery)	7	-3	-2	-1	0	1	2	3	7
Partner previous alliance experiences	7	-3	-2	-1	0	1	2	3	21
								Total D_2=	35

Any negative scores require review

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Source: Mortara & Ford (2012)

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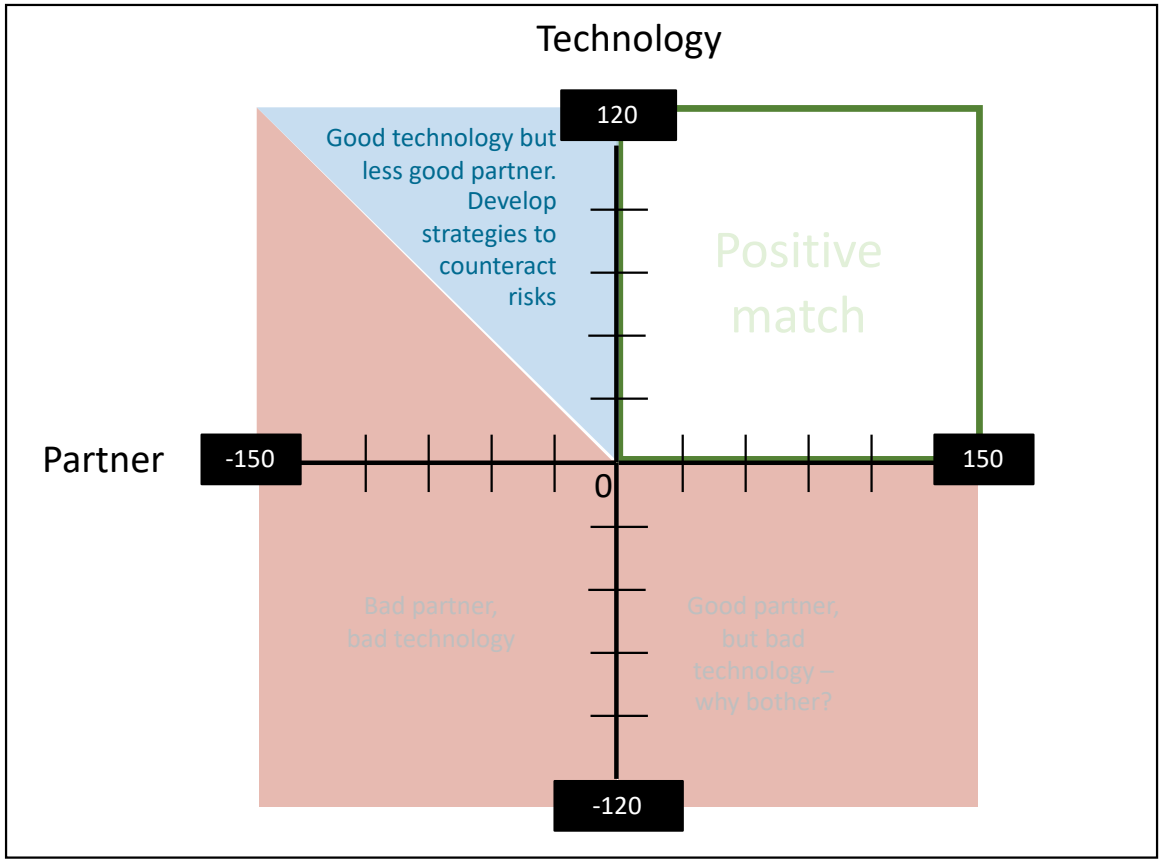
Acquisition evaluation
3. Suitability of the technology for your needs

A_3: Factors	B_2: Importance 1-10	C_3: Scoring							D_3: Final score = B x C
		Low			Average			High	
Degree to which the technology fits with our objectives	8	-3	-2	-1	(0)	1	2	3	0
Degree to which the technology has potential commercial value	9	-3	-2	-1	0	(1)	2	3	9
Ease of overcoming technical challenges	7	-3	-2	-1	0	1	(2)	3	14
Degree of access to know-how (skills and their application to technology)	7	-3	-2	-1	0	(1)	2	3	7
								Total D_3=	30

Any negative scores require review

Source: Mortara & Ford (2012)

Acquisition evaluation - analysis of results



Source: Mortara & Ford (2012)

Case study:

- Technology you are looking to acquire: RFID – radio frequency identification
- Your potential partner company: arrhef-iD
- Your company:
  - Assume your company has decided on acquiring RFID capabilities for a certain application as part of its digital transformation

Case study:

- RFID technology:
  - Applications:
    - Production tracking
    - Inventory management
    - Asset tracking
    - Personnel tracking (incl. controlling access to restricted areas)
    - ID badging
    - Supply chain management,
    - etc .

Case study:

arrhefiD

- Your potential partner: **arrhef-iD**

- New, promising and exciting EU-based entrant into RFID market
  - Appears highly technically capable, boasting of new RFID technology, communication protocols, and data analytics platform
  - **Cutting edge RFID**: Promises faster, cheaper, more reliable, more volume, more secure, etc. up to 3x of other leading technologies (and leading RFID solutions providers); ability to run bespoke analytics based on your specific needs; **Boasts Industry 4.1 ready!!!**

- Recently acquired by Chinese e-commerce giant
  - Officially, operates independently of parent company although relies on parent company's cloud computing architecture
  - Parent company's owner rumoured to have strong links with the government and military
  - Arrhef's technology will eventually be rolled out within parent company's vast operations (and quite possibly, its governments' initiatives)

- A driven company - Driven, but under pressure
  - 36-year old CEO – Isla Fischer; expert in electronics and communications; strong work-ethic that permeates the rest of the company
  - Small workforce, less than 50 people – will initially be relying on trained 3rd party contractors for technology roll-out/installation. CEO is confident they can very quickly ramp up roll-out by training more contractors, although this is yet to be proven
  - Company under considerable pressure to find new customers and long-term partners; and to show itself as a big player. However, no well-known organisations signed-up yet. Has good track record with a few small companies in Asia
  - The company is currently pursuing several big names in EU and US in retail, energy, healthcare and pharmaceuticals. It is rumoured to be quite advanced in talks with a couple of big players
  - Company keen to prove itself as a reliable partner, and is currently very happy to go the extra mile to satisfy clients

Case study:

- YOUR Company:
- You have decided RFID is a technology that aligns with, and will enable your digital transformation goals; it is a technology that will bring value to your operations
  - *Assume at least one of the RFID applications as your focus*

- Use your current best understanding of your company in scoring
  - *Make sensible assumptions/guesses if necessary*
  - *Flag areas where you think your knowledge is imperfect so you can follow-up*

Activity:
Step 1a: Assessing your organisation's ability to absorb the new technology

Checklist 1

A_1: Factors	B_1: Importance 1-10	C_1: Scoring							D_1: Final score = B x C
		Low			Average			High	
Our level of technical knowledge related to this technology		-3	-2	-1	0	1	2	3	
Our level of technological knowledge and expertise in acquiring technology		-3	-2	-1	0	1	2	3	
Our level of internal support for the acquired technology		-3	-2	-1	0	1	2	3	
Our capability to apply technology in new products		-3	-2	-1	0	1	2	3	
Our capability to exploit and reuse technological knowledge acquired from the external world		-3	-2	-1	0	1	2	3	
								Total D_1=	

Any negative scores require review

Source: Mortara & Ford (2012)

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Our level of internal support for the acquired technology	8	-3	-2	-1	0	1	(2)	3	16
Our capability to apply technology in new products	5	-3	-2	-1	(0)	1	2	3	0
Our capability to exploit and reuse technological knowledge acquired from the external world	8	-3	-2	-1	0	1	2	(3)	24
								Total D_1=	39

Any negative scores require review

Source: Mortara & Ford (2012)

Activity:
Step 1b: Assessing compatibility between you and your potential partner

Checklist 2

A_2: Factors	B_2: Importance 1-10	C_2: Scoring							D_2: Final score = B x C
		Low			Average			High	
Previous knowledge of partner		-3	-2	-1	0	1	2	3	
Market acceptance of the alliance (e.g. customers, competitors and government)		-3	-2	-1	0	1	2	3	
Partner technical capability		-3	-2	-1	0	1	2	3	
Partner working style compatibility (e.g. flexibility, trustworthiness, project delivery)		-3	-2	-1	0	1	2	3	
Partner previous alliance experiences		-3	-2	-1	0	1	2	3	
								Total D_2=	

Any negative scores require review

Source: Mortara & Ford (2012)

Activity:
Step 1b: Assessing compatibility between you and your potential partner

Checklist 2

A_2: Factors	B_2: Importance 1-10	C_2: Scoring							D_2: Final score = B x C
		Low			Average			High	
Previous knowledge of partner	8	-3	(-2)	-1	0	1	2	3	-16
Market acceptance of the alliance (e.g. customers, competitors and government)	5	-3	-2	-1	0	(1)	2	3	5
Partner technical capability	9	-3	-2	-1	0	1	(2)	3	18
Partner working style compatibility (e.g. flexibility, trustworthiness, project delivery)	7	-3	-2	-1	0	(1)	2	3	7
Partner previous alliance experiences	7	-3	-2	-1	0	1	2	(3)	21
								Total D_2=	35

Any negative scores require review

Source: Mortara & Ford (2012)

Activity:
Step 1c: Assessing the suitability of the technology for your needs

Checklist 3

A_3: Factors	B_2: Importance 1-10	C_3: Scoring							D_3: Final score = B x C
		Low			Average			High	
Degree to which the technology fits with our objectives		-3	-2	-1	0	1	2	3	
Degree to which the technology has potential commercial value		-3	-2	-1	0	1	2	3	
Ease of overcoming technical challenges		-3	-2	-1	0	1	2	3	
Degree of access to know-how (skills and their application to technology)		-3	-2	-1	0	1	2	3	
								Total D_3=	

Any negative scores require review

Source: Mortara & Ford (2012)

Activity:
Step 1c: Assessing the suitability of the technology for your needs

Checklist 3

A_3: Factors	B_2: Importance 1-10	C_3: Scoring							D_3: Final score = B x C
		Low			Average			High	
Degree to which the technology fits with our objectives	8	-3	-2	-1	(0)	1	2	3	0
Degree to which the technology has potential commercial value	9	-3	-2	-1	0	(1)	2	3	9
Ease of overcoming technical challenges	7	-3	-2	-1	0	1	(2)	3	14
Degree of access to know-how (skills and their application to technology)	7	-3	-2	-1	0	(1)	2	3	7
								Total D_3=	30

Any negative scores require review

Source: Mortara & Ford (2012)

Activity:
Step 1a – 1c

Steps 1a – 1c

- Enter the importance of each factor in the checklist in Column B
- Rate each factor
  - discuss each factor in as much detail as possible before you rate it (if possible).
- Obtain final score for each item and enter this in Column D

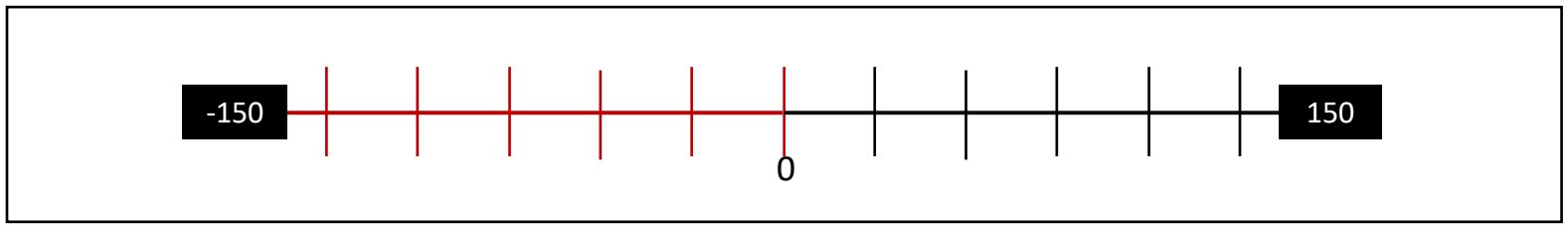
Step 2a and 2b

- Use the charts to map your position.
- Review the mapping and individual scores that make it up
- Identify risks and discuss contingencies

Activity:
Step 2: Assessing results from checklists; Risks and contingency plans

a. Assessing your company's ability to absorb new technology

Mark your total D_1 score on the scale below



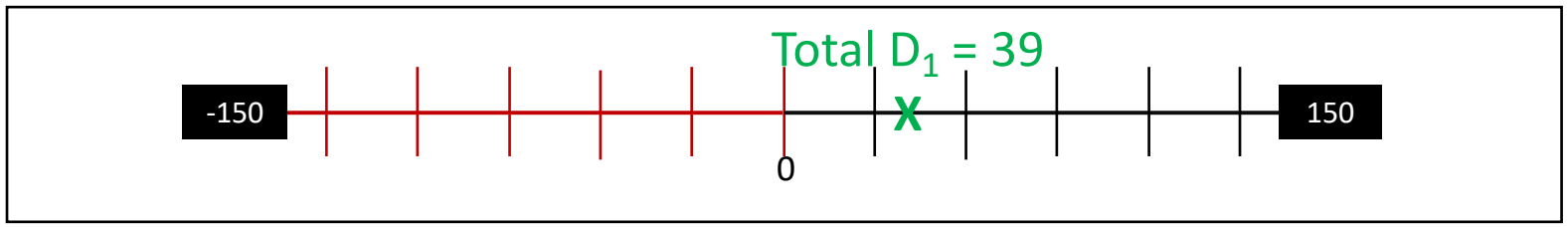
Areas of risk will be those items in Checklist 1 with strongly negative values – even if your overall result is positive. For any negative scores, it is important to consider how you could improve your company's capabilities in these areas and/or implement contingency plans to minimise any risk.

Source: Mortara & Ford (2012)

Activity:
Step 2: Assessing results from checklists; Risks and contingency plans

a. Assessing your company's ability to absorb new technology

Mark your total D_1 score on the scale below



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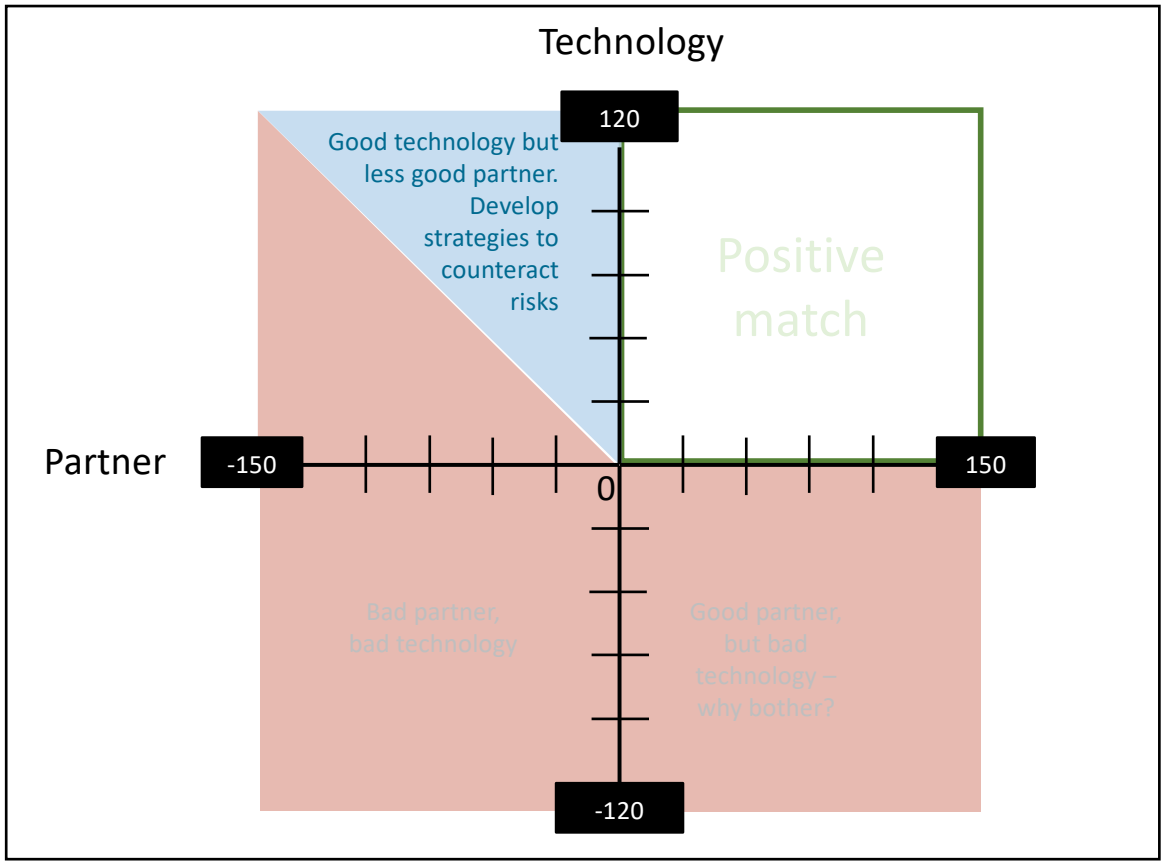
Source: Mortara & Ford (2012)

Activity:
Step 2: Assessing results from checklists; Risks and contingency plans

b. Assessing *partner compatibility* and *technology suitability*

Areas of risk will be those items in Checklists 2 and 3 with strongly negative values – even if your overall result is positive.
For any negative scores, it is important to consider how you could improve your company's capabilities in these areas and/or implement contingency plans to minimise any risk.

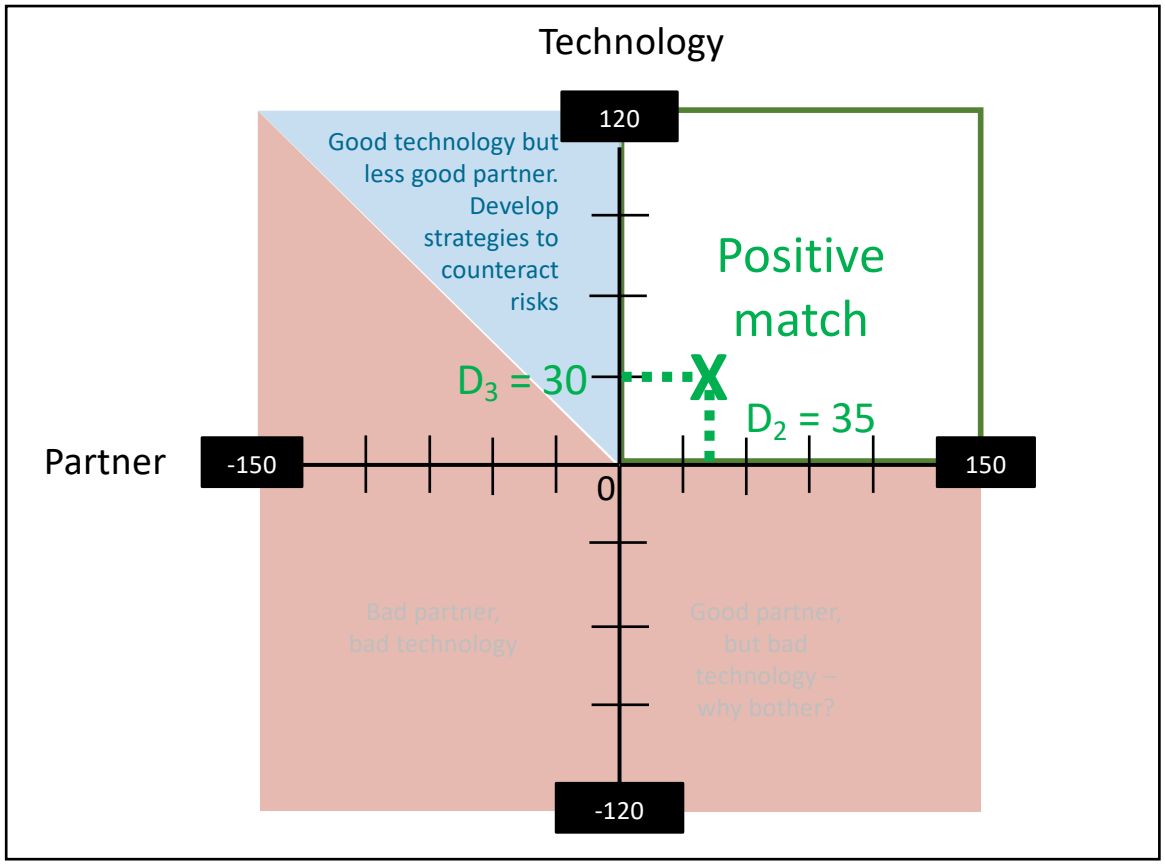


Source: Mortara & Ford (2012)

Activity:
Step 2: Assessing results from checklists; Risks and contingency plans

b. Assessing *partner compatibility* and *technology suitability*

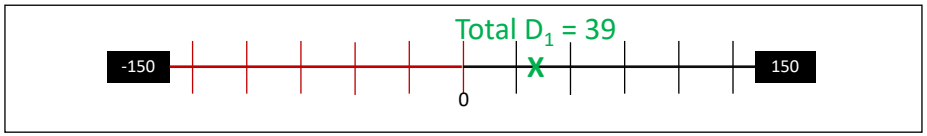
Areas of risk will be those items in Checklists 2 and 3 with strongly negative values – even if your overall result is positive.
For any negative scores, it is important to consider how you could improve your company's capabilities in these areas and/or implement contingency plans to minimise any risk.



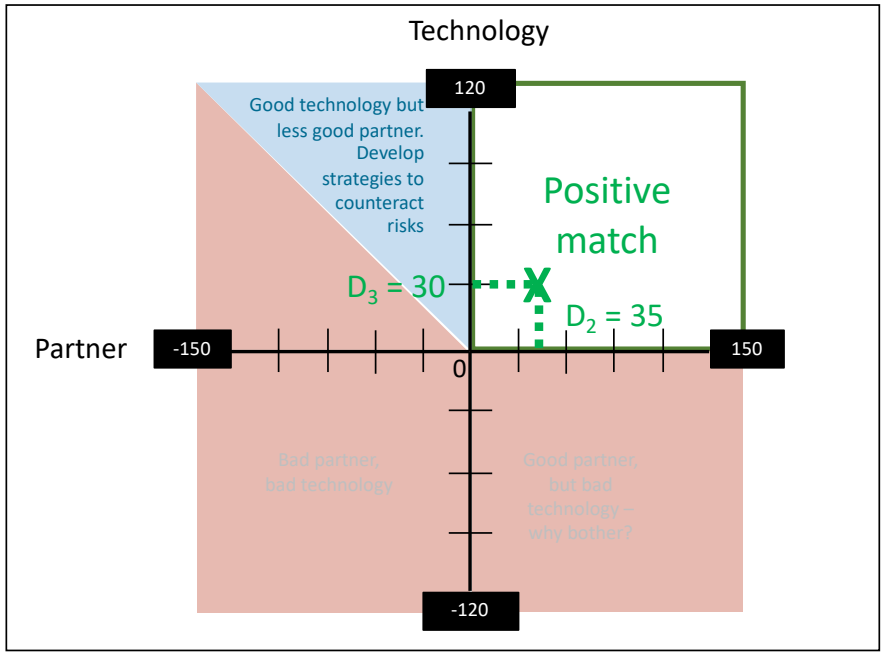
Source: Mortara & Ford (2012)

Activity discussion and feedback

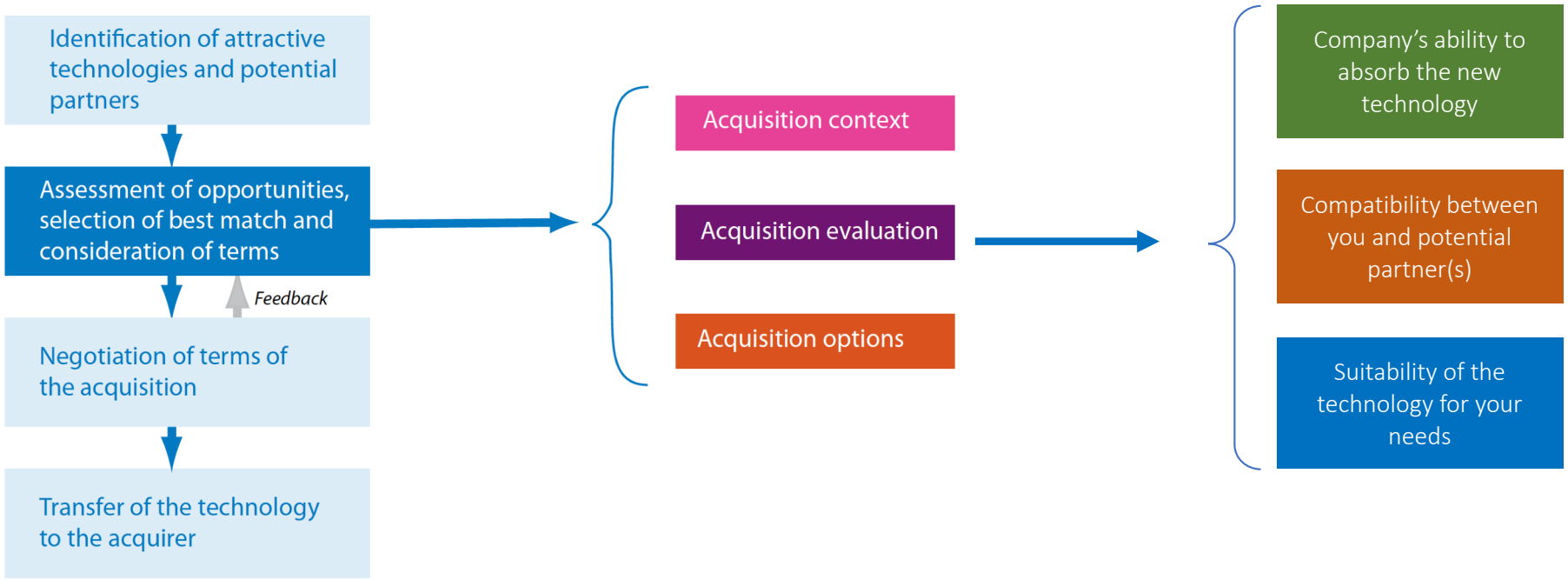
a. Your ability to absorb new technology



b. Assessing *partner compatibility* and *technology suitability*

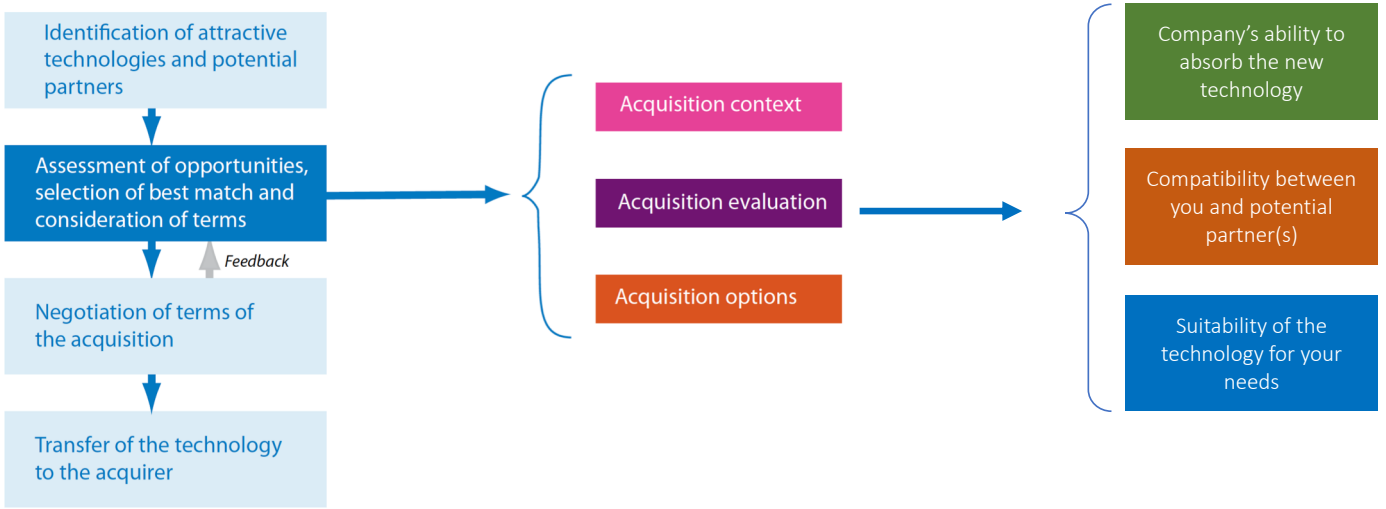


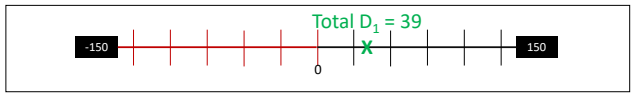
Process discussion

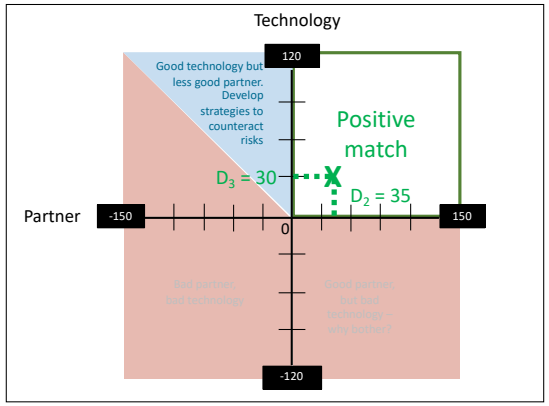


The technology acquisition process
Source: Mortara & Ford (2012)

Summary


Identification of attractive technologies and potential partners
Assessment of opportunities, selection of best match and consideration of terms
Feedback
Negotiation of terms of the acquisition
Transfer of the technology to the acquirer
Acquisition context
Acquisition evaluation
Acquisition options
Company's ability to absorb the new technology
Compatibility between you and potential partner(s)
Suitability of the technology for your needs


Total D_1 = 39
-150
150
0


Technology
120
Good technology but less good partner. Develop strategies to counteract risks
Positive match
D_3 = 30
D_2 = 35
Partner
-150
150
0
-120

References (and resources)

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- Kerr, C. I. V., et al. (2006). A conceptual model for technology intelligence. International Journal of Technology Intelligence and Planning, 2006. 1 (2): p 73 – 93
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- Mortara, L. and S. Ford. (2012). Technology acquisitions: a guided approach to technology acquisition and protection decisions. University of Cambridge Institute for Manufacturing ISBN 978-1-902546-39-1 https://www.ifm.eng.cam.ac.uk/insights/open-innovation/technology-acquisition-and-protection/
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