34th Annual INCOSE international symposium

hybrid event

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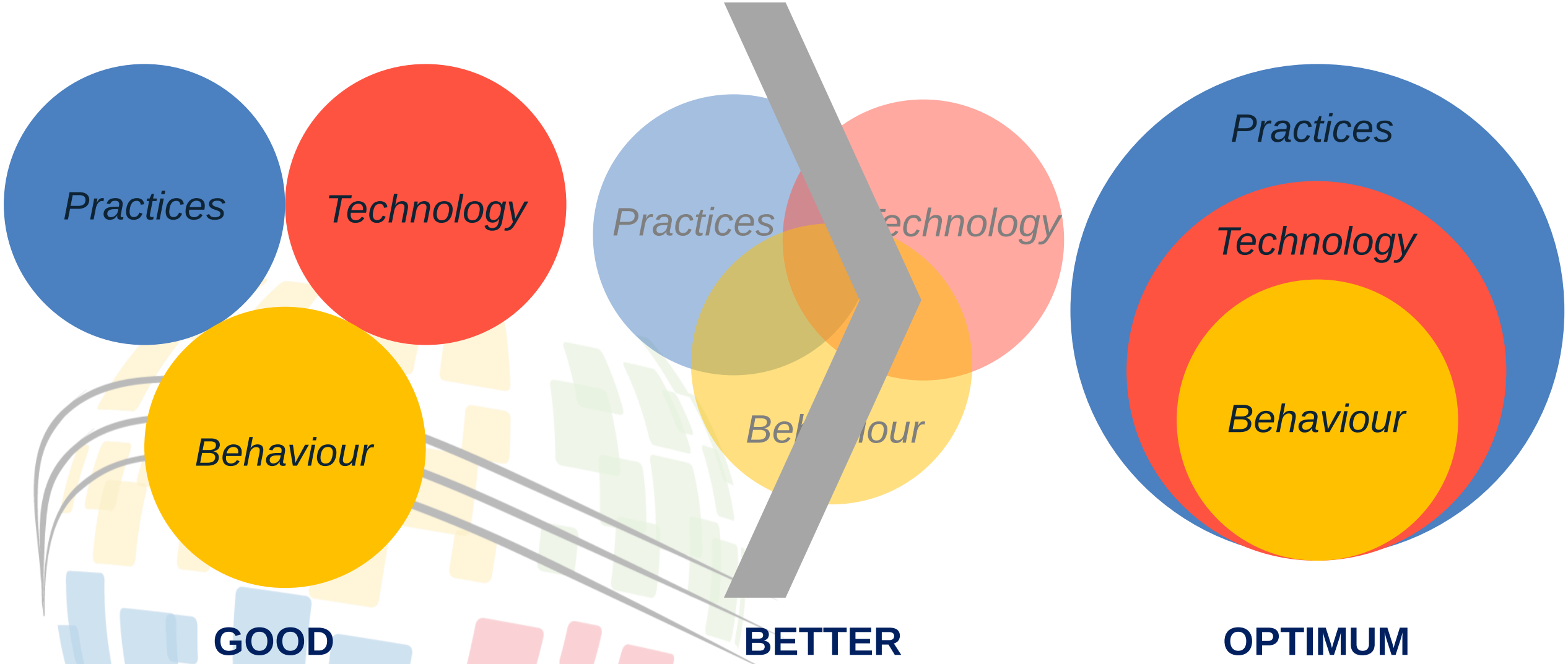
The A to Z for Implementing a Digital Transformation (DT) on a Systems Project

Trials & Tribulations of Transforming

Expected Outcomes from a Digital Transformation (DT)

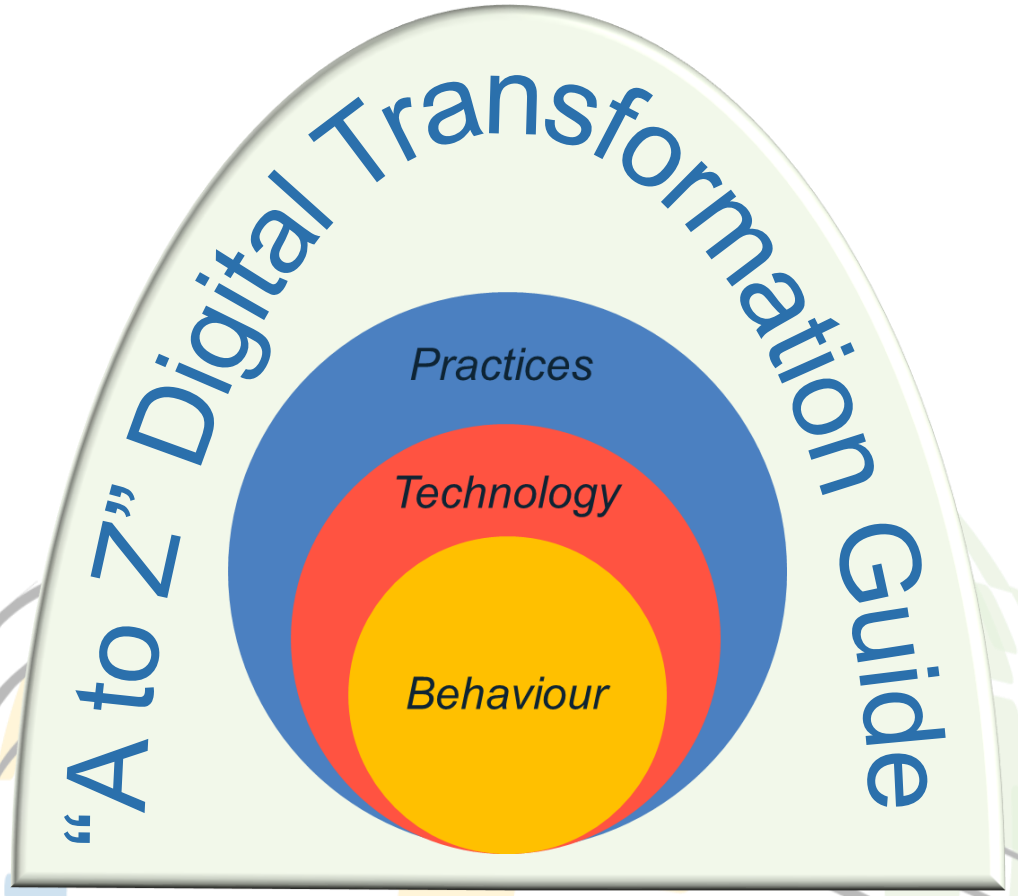
- Value creation
- Generation of data & knowledge
- Streamlined & “automated” processes
- Model based approaches
- Digital skilled organisation
- Multiple platform & infrastructure options
- Faster responsiveness
- Increased experimentation
- Greater collaboration & sharing capability
- Improved “what if” analysis
- Improved “speed to market”
- And more…

Ideal Digital Transformation Pattern



GOOD **BETTER** **OPTIMUM**

To Navigate the Digital Transformation (DT)



- Format for each letter –
  - Key word
  - Description
  - Importance
  - Bridges & Blockers – these are examples only
- Note that although the presentation will include 26 tips, when presenting only a handful will be discussed due to time limitations

A to Z Digital Transformation (DT) Guide (1/7)

A Agility

Description: Agility is required when delivering solutions (product/system/service) when knowledge is uncertain & operational environments are dynamic

Importance: Provides the means to improve responsiveness

**Bridge(s): Modular architectures / shared knowledge management / attentive situational awareness*

**Blocker(s): Heavy processes / monolithic organisations / "old" acquisition schemes / wrong lifecycles*

B Business

Description: A digital mindset of the entire enterprise is required for a DT to sustain & possibly grow a business

Importance: The enterprise must sponsor, govern, evolve & flourish through a DT

**Bridge(s): Digital resources / early adopters / digital mindset / tailorable company processes*

**Blocker(s): Existing contractual frameworks / financial cycles / fear of change/failure / low risk profile*

C Culture

Description: An organisation's culture reflects its willingness to adopt & adapt a digital mindset to enable the practices & technologies for a DT

Importance: Without "a shared vision", any attempt to carry out a DT will be sub-optimum

**Bridge(s): Understanding the systems thinking "iceberg" / skilled digital workforce / early adopters*

**Blocker(s): Resistance to change / uninformed workforce / unskilled in digital technologies / fear of failure*

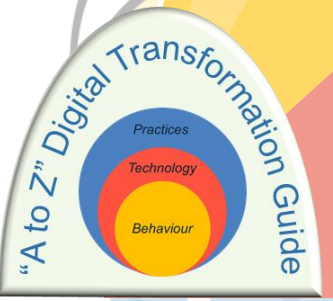
D Data

Description: Defining, creating, sharing, storing & protecting data is key for a DT

Importance: There is no DT without data & the ability to analyse the data, possibly using new techniques such as visual data analytics & augmented data analytics

**Bridge(s): Digital competent workforce / ability to categorise data & adjust the way the data is handled / $$ asset*

**Blocker(s): Unskilled digital workforce / wrong competencies / lack of digital resources / poor workflows*



Key: Behaviour | Technology | Practices

* Examples Only

A to Z Digital Transformation (DT) Guide (2/7)

E Efficiency

Description: A DT strives to achieve an outcome that minimizes waste
Importance: A DT aims to improve efficiencies through optimizing resources at appropriate need times with little waste, energy or effort, while achieving the desired outcome
**Bridge(s): Quick wins that makes things easier (e.g. online collaboration tools) / automated workflows*
**Blocker(s): Inflexible contractual frameworks / inappropriate development lifecycles / non-agile practices*

F Flexibility

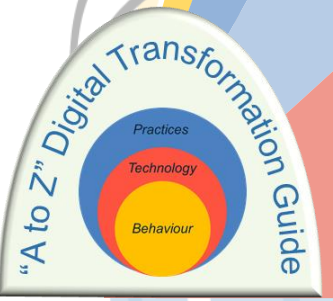
Description: Flexibility is necessary to accommodate the expected levels of agility, key for a DT
Importance: A DT considers the needed responsiveness to accommodate changing business needs, the dynamic operational environments, & uncertainty
**Bridge(s): Collaboration tools / strong change management / attentive situational awareness / shared vision(s)*
**Blocker(s): Silo "structures" / lack of continuity between engineering artefacts / vertical decision making*

G Governance

Description: A DT requires a strong governance regime
Importance: A DT must align with an organisation's objectives while still being responsive through strategic-based agility methods & flexibility
**Bridge(s): Strategic vision & plan for the DT / clear accountability / decision-making at the right level*
**Blocker(s): Old/dated existing governance regimes / lack of understanding of a DT / fear of change*

H Hybrid

Description: Hybrid solutions involving combinations of computing on-premises, front edge, & cloud-based infrastructure are important for a DT
Importance: Alternate computing options provide flexibility in a DT
**Bridge(s): Solutions combining digital with non-digital elements / tailorable processes / stepwise roadmaps*
**Blocker(s): Sovereignty considerations / IP rights / security / non-modular architectures*



Key: Behaviour | Technology | Practices

* Examples Only

A to Z Digital Transformation (DT) Guide (3/7)

I Innovation

Description: Transformations typically require innovation - DT is no different. Possible innovations relate to products & systems, services, practices, &/or organisational changes

Importance: DT & innovation go hand-in-hand, each supporting the other

**Bridge(s):* *Digital solutions can support more "dynamic trial & error" activities / digital technologies*

**Blocker(s):* *Lack of sponsor(s) / short term goal focus / lack of investment in digital technologies*

J Journey

Description: DT is a journey, progressively building on each implemented initiative

Importance: A successful DT is the collection of various elements of an organisation, not just digital technologies, that combine enable the enterprise to advance

**Bridge(s):* *Forward looking strategy / shared vision / DT roadmap / informed workforce / digital skills*

**Blocker(s):* *Fear of change / "wed to the current practices" / lack of digital resources / unskilled workforce*

K Knowledge

Description: Just as data is key to a DT, when put into context, knowledge is generated

Importance: Applying DT will increase the generation of data which in turn should increase knowledge & our ability to share it through greater data analytic capabilities

**Bridge(s):* *Data analytic & management tools / collaboration tools / networking technologies*

**Blocker(s):* *IP constraints / security / knowledge silos / inappropriate protection of data / mistrust*

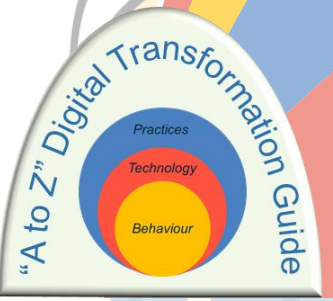
L Legacy

Description: Stepwise transformations for digitalization are recommended building on the successful legacy products, systems, & services

Importance: The successes of the past should be considered as a foundation of the future

**Bridge(s):* *Good & trusted reputation / strong existing product/system/service as foundation / loyal client-base*

**Blocker(s):* *"Wedded" to the legacy solution / unable to communicate transformation advantages / big bang approach*



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* Examples Only

A to Z Digital Transformation (DT) Guide (4/7)

M Model

Description: Models are instrumental in progressing solutions through a DT
Importance: Models are responsible for generating the data, analysing the data, & creating value – invaluable in a DT
**Bridge(s): Modelling mindset / digital skills / collaboration tools / forward looking aptitudes*
**Blocker(s): Inability to understand the model / inexperience working with models / instant value creation*

N Numerical

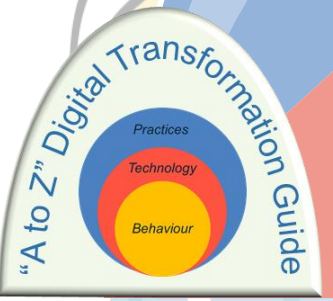
Description: Numerical methods & programming provide the tools for digitalisation
Importance: Numerical representations & solutions underpin a DT when considering automation, robotics & machine tooling
**Bridge(s): Digital technologies / programming & algorithmic skills / strong workflows / economies of scale*
**Blocker(s): Unskilled digital workforce / lack of investment / short term roadmaps*

O Operations

Description: A DT considers the dynamics of the operational ecosystem
Importance: Operational concepts & practices evolve to either match or guide the DT, resulting in equal or better performance for a successful transformation
**Bridge(s): Operational scenarios / repeatable practices / common goals / models / roadmaps*
**Blocker(s): Irregular, adhoc practices / lack of planning / inability to handle progressive changes*

P Platform

Description: The selection of the platform(s) is important for a DT
Importance: The platform underpins the exchange of data for a product, system & service, fostering collaboration, integration, interoperability, scalability & upgradeability
**Bridge(s): Data models / secure networks & infrastructure / scalable & flexible architectures*
**Blocker(s): Lack of digital resources / sovereignty / security / monolithic architecture*



Key: Behaviour | Technology | Practices

* Examples Only

A to Z Digital Transformation (DT) Guide (5/7)

Q Quality

Description: A DT aims to exceed the current quality of product, system, & service, experienced by end users of the existing solutions

Importance: A DT strives to deliver value, reduce waste & meet high quality standards

**Bridge(s): Strong legacy foundations / modelling & simulations / continuum of data / user feedback*

**Blocker(s): Lack of investment / ignoring legacy & its practices / not building on previous experience*

R Resilience

Description: Operating under increasing uncertainty & dynamic ecosystems requires resilience

Importance: Without the ability to predict all outcomes a DT must produce resilient outputs, as well as the transformation itself must be resilient

**Bridge(s): Key architecture drivers / architecture patterns to replicate / operational scenarios / "what-if" analysis*

**Blocker(s): Unfunded / inappropriate risk profile / monolithic architecture / not knowing how to be resilient*

S Security

Description: A DT addresses security, from both the perspective of the transformation & the digitalization of the product, system, & service

Importance: A transformation requires cybersecurity measures to protect the data, key to a DT

**Bridge(s): Cybersecurity "in our DNA" / digital technologies / organisation's reputation / proven building blocks*

**Blocker(s): Lack of funding / ignorance of security consequences / inappropriate risk profile*

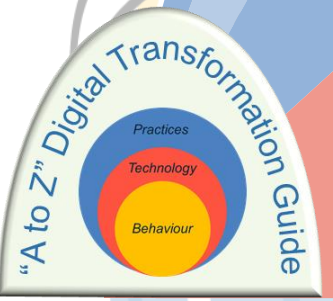
T Twinning

Description: Digital twinning, whether a digital twin, sister or shadow, can optimise a DT

Importance: Digital twins support anticipation, collaboration, & reaction analytics, reflecting the behaviour of the entity of interest purely from a digital space

**Bridge(s): Investment opportunity / safety & security focus / "what if" analysis / use of tangible entities*

**Blocker(s): Lack of funding / maintaining the twin lifecycle / unrealistic representation / lack of data-centric focus*



Key: Behaviour | Technology | Practices

* Examples Only

A to Z Digital Transformation (DT) Guide (6/7)

U Upgradability

Description: A DT strengthens upgradability, in turn enhancing responses to change
Importance: Products, systems, & services have improved performance & increased longevity through upgrade strategies, better supported through a DT
*Bridge(s): *Product-system-service roadmaps / technology horizon scans / planned refresh programs*
*Blocker(s): *Lack of forward thinking / "wedded" to legacy solution / extensive regression testing*

V Virtualisation

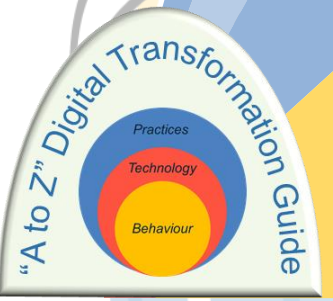
Description: Seek to augment or virtualize the products, systems, & services through a DT
Importance: Virtualisation through a DT enables greater agility, flexibility & experimentation in developing the real solution while potentially minimising costs
*Bridge(s): *Digital technologies & resources / synthetic environment / modelling & simulation skills*
*Blocker(s): *Lack of realistic models / maintaining correlation between real & virtual space / lack of investment*

W Workflow

Description: A DT can optimise the sequencing of tasks & activities, streamlining workflow
Importance: Digitalisation of workflows increase collaboration, reduce potential rework, & aid in measuring progress
*Bridge(s): *Collaboration tools / integrated engineering workbenches / AI powered assistance / lean practices*
*Blocker(s): *"Heavy" processes / adhoc behaviour / extensive vertical decision-making / lack of trust in automation*

X Xenacious

Description: The want to change & possibly experiment boosts the implementation of a DT
Importance: To test, try, & learn rather than seeking perfection in the first instance, exhibits a digital mindset, necessary to successfully implement a DT
*Bridge(s): *Forward looking mentality / psychological safe workplace / risk adopter*
*Blocker(s): *Fear of change / risk adverse / daily constraints dominating worktime / lack of experimentation facility*



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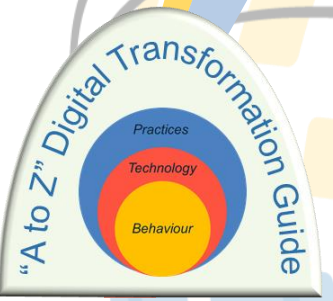
A to Z Digital Transformation (DT) Guide (7/7)

Y You

Description: A DT requires all stakeholders to align with the transformation
Importance: Having the latest technologies & digital practices will not guarantee a successful DT. An enterprise must has all stakeholders "on board" for the transformation
Bridge(s): Common vision / investments / collaboration tools / transformation plan & roadmap
Blocker(s): Lack of "one team" mentality / Fear of change / "wedded" to legacy solutions & practices

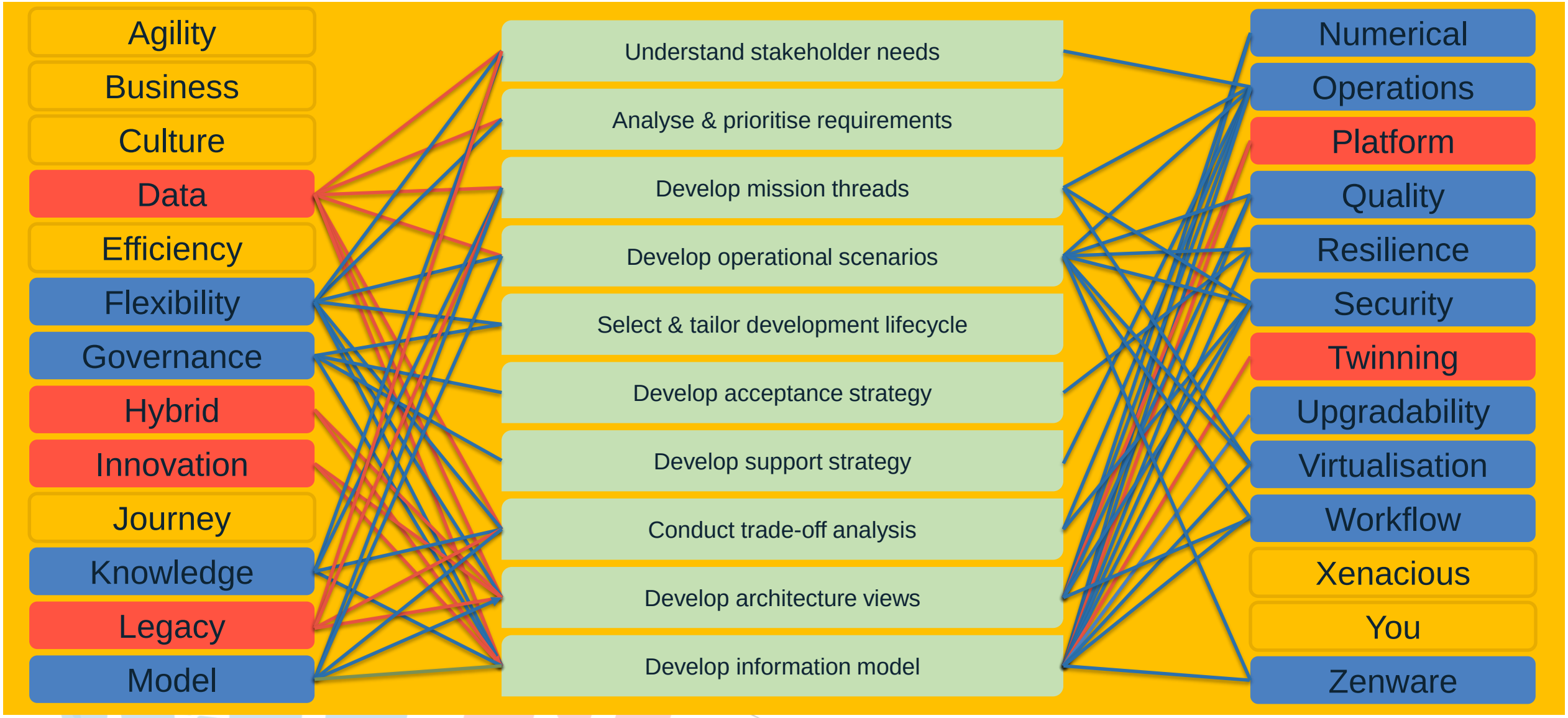
Z Zenware

Description: Keep a DT as simple as possible with the end user in mind
Importance: Uncomplicated user interfaces enhance adoption of the digitalized products, systems, & services
Bridge(s): Operational scenarios / feedback opportunities / modelling & simulation / training & coaching
Blocker(s): Limited feedback loops / lack of operational understand or end user needs / complicated toolset

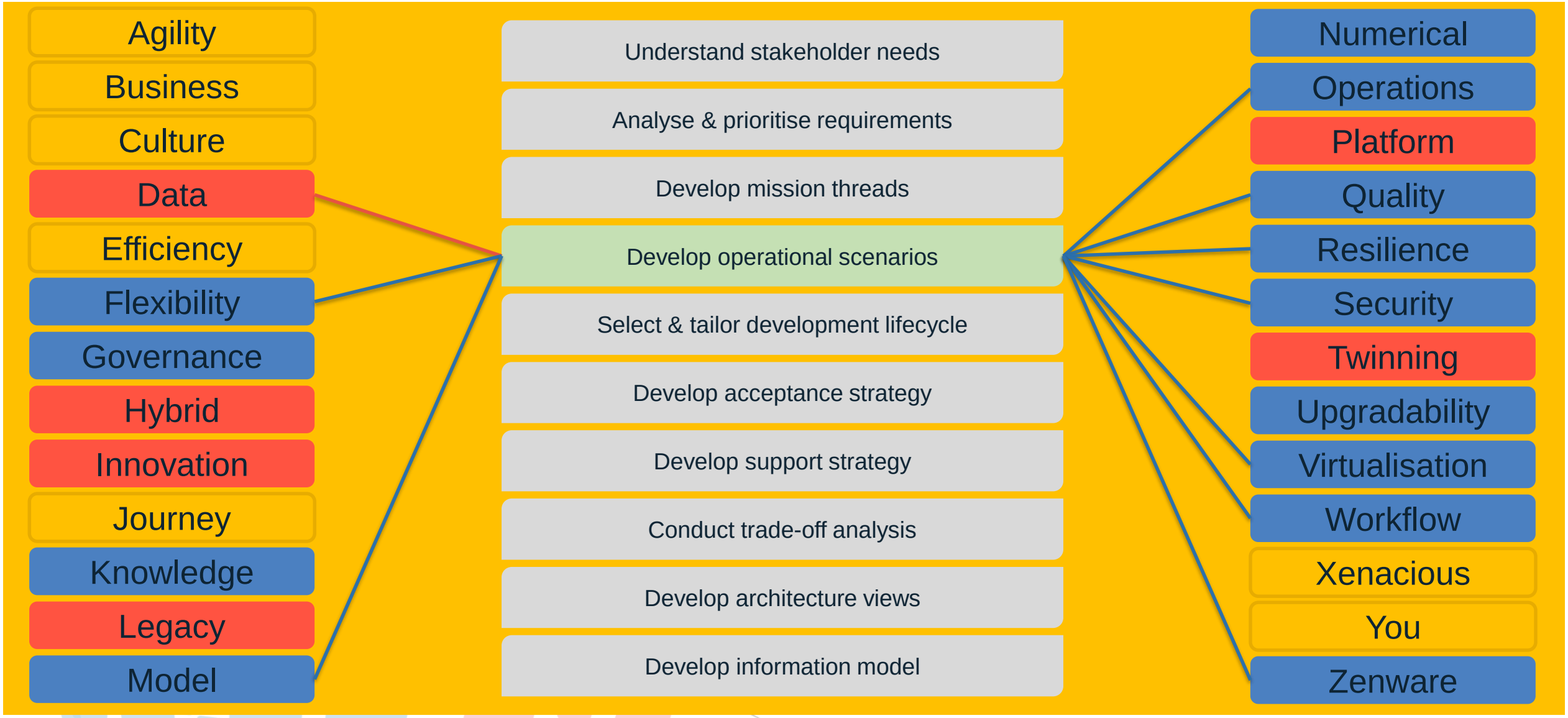


Key: Behaviour | Technology | Practices * Examples Only

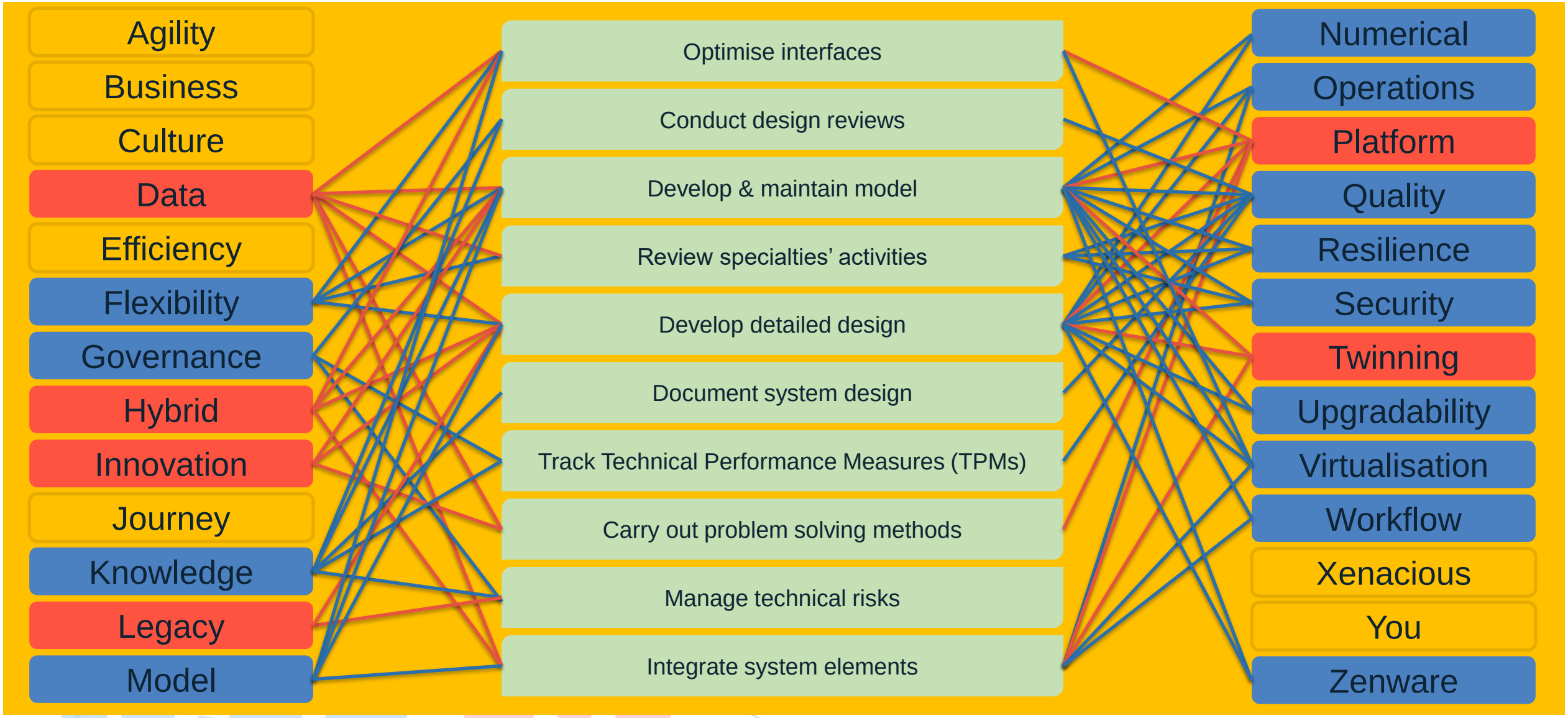
Mapping DT Guidance to Typical SE Practices (1/3)



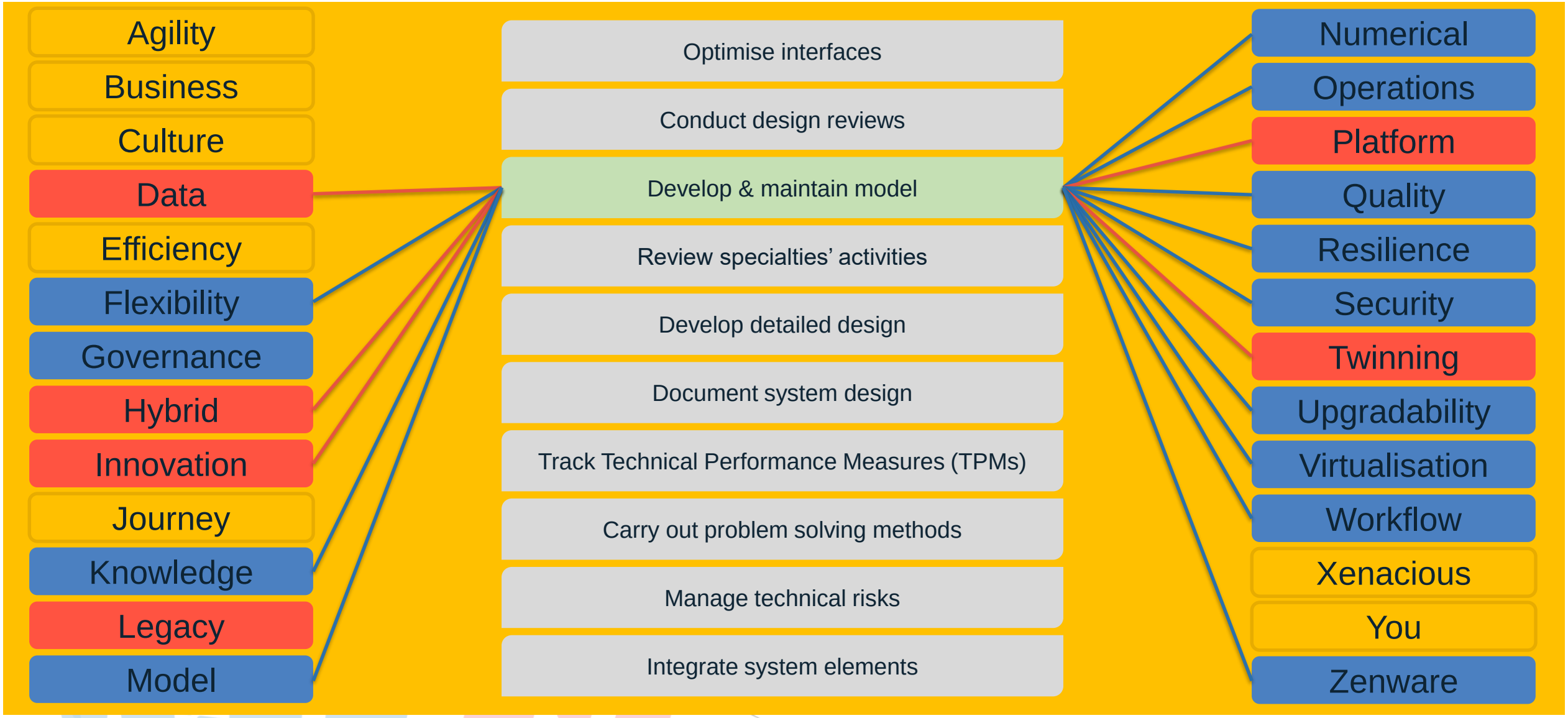
Example – Develop Operational Scenarios



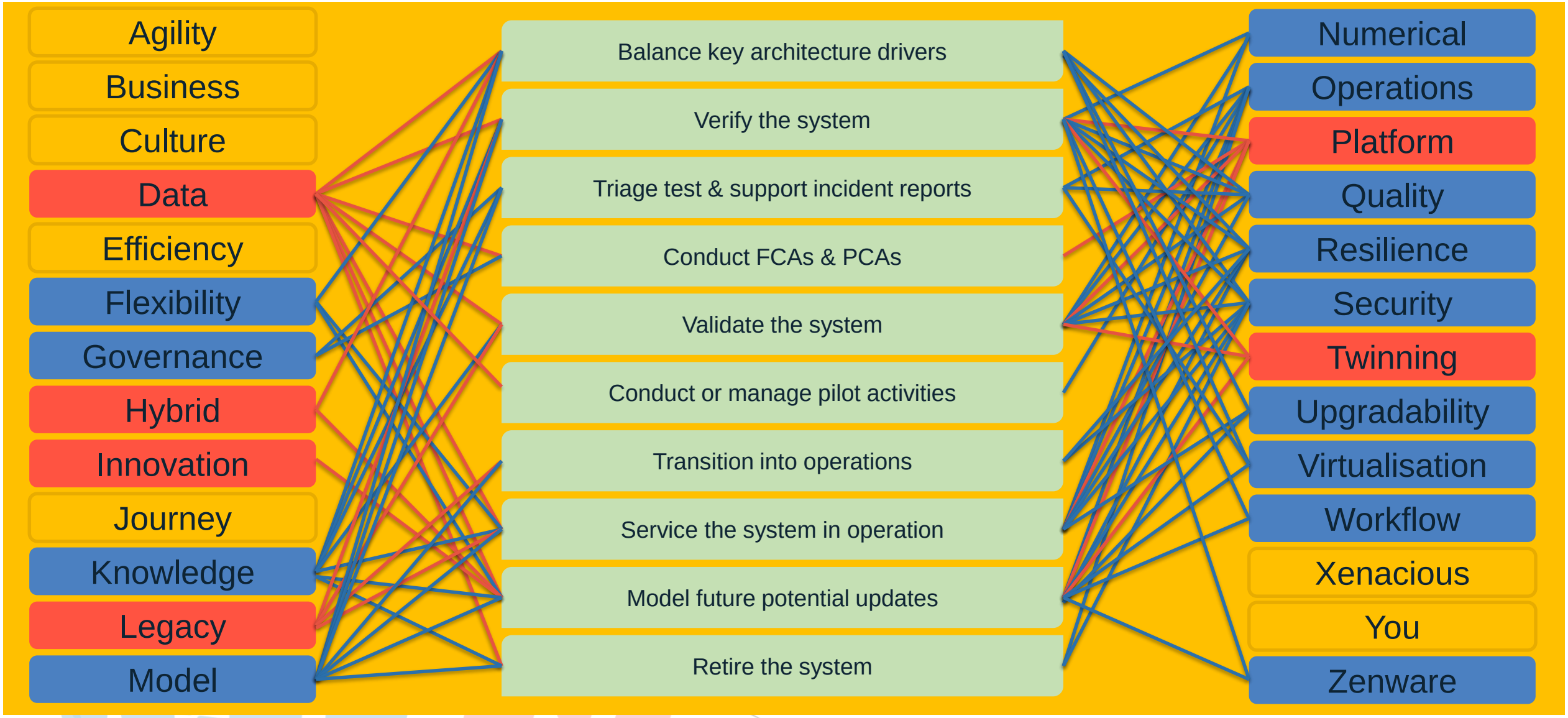
Mapping DT Guidance to Typical SE Practices (2/3)



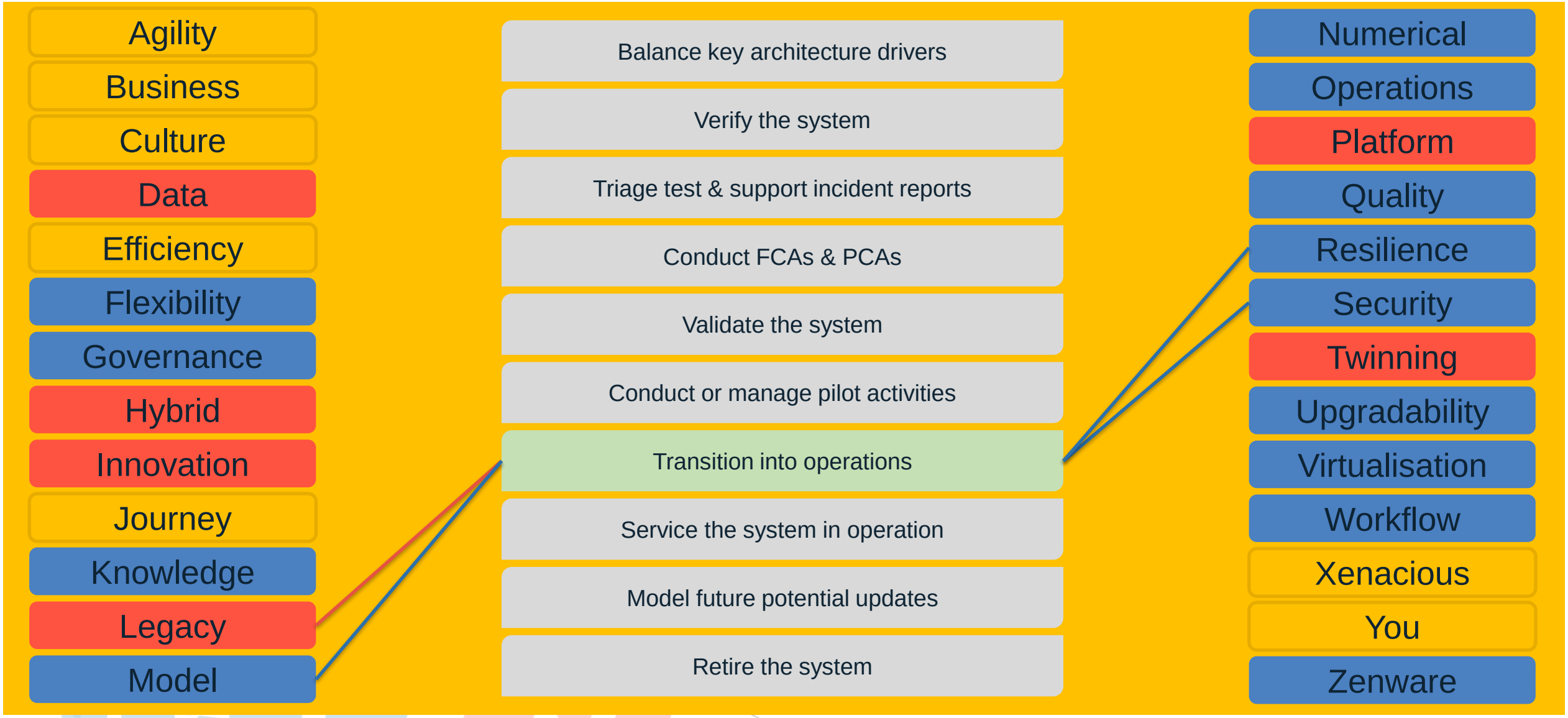
Example – Develop & Maintain Model



Mapping DT Guidance to Typical SE Practices (3/3)

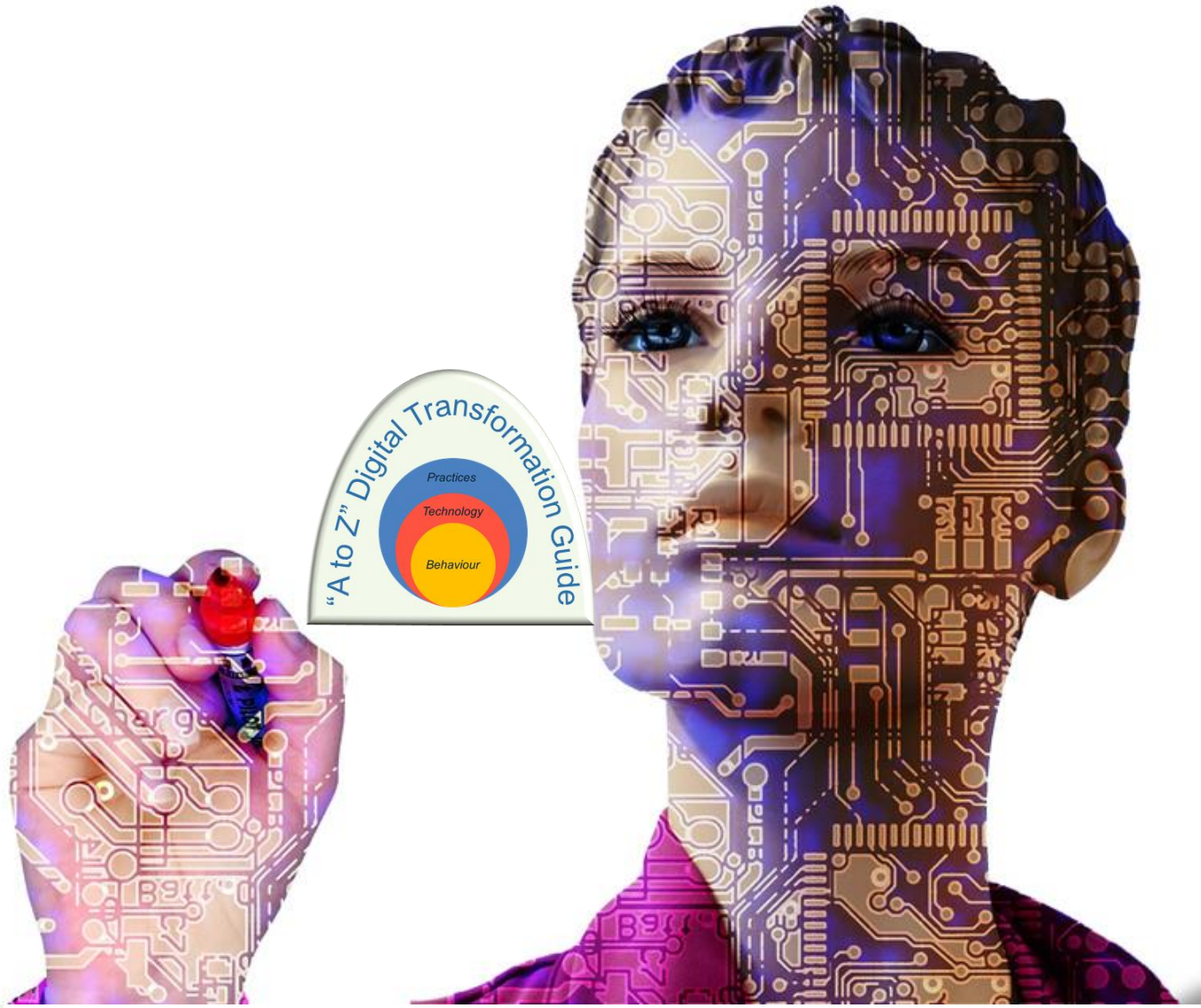


Example – Transition into Operations



Summary

- Strong digital culture
- Clear DT objectives
- Investment is necessary
- Identifying what needs to be digitalised → DT roadmap
  - Progressive DT recommended
  - Build on legacy
- Data is the asset
- Digital “upskilling” is necessary
- Digitalisation state > current state
  - Value creation!



Q&A Time

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