Principles in Patterns (PiP): Embedding phase

C-CAP embedding and work plan

August 2012 – April 2013

August 2012

University of Strathclyde

JISC

Contents

1. C-CAP embedding background

1.1 PiP background

Innovative approaches to technology-supported curriculum design offer an opportunity for improving academic quality, pedagogy and learning impact [1]. Those approaches that are innovative in their use of technology offer the potential of an interactive curriculum design experience within which the designer is offered system assistance to better adhere to pedagogical best practice, is exposed to novel and high impact learning designs from which to inspire reflective design, and benefits from system support to detect common design issues which might otherwise delay curriculum approval or usurp the resources of academic quality assurance teams. It is also anticipated that technology-supported approaches can improve the efficacy of curriculum approval processes at universities, thereby increasing the curriculum responsiveness of institutions and supporting improved and rapid review mechanisms which may support enhancements to pedagogy [2]. Responsive curriculum design and approval, and the rapid generation of curricula that this infers, is increasingly necessary to respond to changing academic contexts and the changing needs of stakeholders (e.g. employers, professional bodies, etc.) [3], [4]. The emerging globalized university sector [5], [6] also contributes to these pressures by frequently necessitating the creation of specialist curricula, either to attract international students or to render curricula conducive to delivery at international branch campuses [7].

As part of the JISC 5/08 Institutional Approaches to Curriculum Design Programme [8], the Principles in Patterns (PiP) Project (http://www.principlesinpatterns.ac.uk) investigated and developed a technology-supported approach to curriculum design and approval. PiP Project investigation and development activity ended in August 2012. Attention has now turned to the embedding phase of the Project (August 2012 – April 2013).

The purpose of this paper is to document a suitable embedding strategy and plan for successfully implementing C-CAP across the University of Strathclyde. This plan is informed by the systems and technology implementation literature and also includes and timetables significant outstanding work or actions arising from the PiP Final Evaluation Report (WP7:40 Project evaluation synthesis) [9]. Internal discussions within the C-CAP team have also informed the key tenets of the embedding plan (Appendix B).

2. Embedding strategy

2.1 Related implementation and embedding work

Implementation is concerned with deploying a new system or technology within an organisation to achieve specific organisational objectives. Embedding also entails the implementation of a new system or technology, but it includes additional activities which are designed to promote the acceptance and sustainability of the system within its organisational context [10–13]. As a concept, embedding is also frequently referred to as “acceptance” within the information systems literature [14], [15]; although more recently “implementation” is also considered within some communities of practice to include embedding activities [16]. Understanding the factors that contribute to the successful embedding of systems in large organisations remains an active area of study, particularly since user resistance is cited as the principal cause of system implementation failure [17]; however, to date no single model for successful embedding or implementation has been proposed. Instead, literature emanating from the information systems literature proposes a number of strategies that demonstrate participative and directive qualities [14]. These range from participative strategies, such as participative system design approaches [14],

[18], [19], to highly directive strategies such as job elimination for those that fail to learn or accept the new system [14]. In recent decades there has been a philosophical shift towards participative embedding approaches as the best way of executing system implementation [18]. This reflects the view that organisations are social systems in which information systems and humans are inexorably linked [20], and therefore the embedding of any new information system requires cognisance of the impact such a system will have on the wider social system [21]. Though some early research questioned the validity of participative approaches [22], its success has more recently been corroborated by implementation research in which staff have been found to respond more effectively to embedding strategies employing participative approaches, e.g. [14], [19], [23], [24]. This tends to include, among other features, those approaches that have adopted open or participative system design approaches [19], emphasised extensive staff training or user support services [24], [25], exemplified fluid staff-management-system team communication [18], [24], demonstrated cognisance of the organisational issues surrounding the embedding of new systems [18], [26] and responded appropriately to the cultural implications of system implementation [27], [28]. Such approaches are normally most successful with management endorsement [18], [24].

The importance of understanding social systems and their influence on information system implementation has also been identified as a key determinant of success [18], [21]. User resistance has been linked to the social or "organisational inertia" [29] that has been shown to typify many organisations [26], [30], [31] and is often linked to the wider political consequences of system implementation [14], [27], [31], particularly the politics of data [26]. Besson and Rowe [29] identify several forms of inertia: psychological, socio-cognitive, socio-technical, economic and political inertia. Pockets of political and socio-technical inertia - and the resistance stemming from this - were identified in PiP evaluation activity [9], [32], [33]. Anecdotal evidence from system piloting also appears to demonstrate levels of socio-cognitive and psychological inertia.

Like the information systems area more generally, few accepted models for successful embedding have been proposed by the learning technology and e-learning communities. A general criticism of this work is its failure to acknowledge or to learn from the extensive embedding and implementation literature that has emerged over several decades from the information systems domain. A number of strategies or approaches have nevertheless been proposed, most of which could be described as participative. For example, Sharpe et al [34] document the case study of the successful implementation of an institution-wide e-learning strategy at a UK university, involving the embedding of several technologies. They identify faculty level e-learning champions and technology experts, devolved e-learning strategies and targeted staff development to be critical in technology embedding success. Lisewski [35] also notes the importance of staff development processes in delivering success. Lisewski's interview based research found "time and space" (i.e. sufficient time for staff to become literate with the new technology) and effective communication channels between relevant organisational levels to be significant factors in implementation success. Understanding the peculiar cultural configurations of HE institutions is also considered by Lisewski to be the most fundamental aspect of achieving successful embedding; that HE institutions are culturally fragmented and tend to have no unified organisational culture and can often be highly individualistic in nature [35]. The research of Silver [36] and Hannan and Silver [37] corroborates this cultural fragmentation, with staff often considering themselves to be driven by individualistic concerns and not united by a single culture. Instead they tend to be united by their discipline, department, research group affiliations, and so forth, which themselves are too diverse and varied to be considered as subcultures. Lisewski [35] therefore advocates an embedding approach incorporating "bottom-up culture". Although Lisewski stops short of proposing a replicable strategy for achieving this, he acknowledges that a system embedding strategy must be tailored to accommodate the varying cultures that can typify HE institutions. Lisewski's findings nevertheless appear to reveal the merit of local champions or change agents [18], [34], [38], capable of understanding the cultural nuances of specific university departments or groupings.

In an audit of successful embedding projects, Dempster and Deepwell [38] found the importance of local technology champions to be particularly important in enabling the benefits to be articulated to – and interpreted by – end user staff. It is noteworthy that analogous examples of this approach from the information systems domain are also available, e.g. “role of champion” [24], “change agents” [18], etc. Technical support and a focus on the professional development of academics were also cited as important. These findings align with guidance from JISC [39] and Sharpe et al. [34], the latter of whom acknowledges the work of Dempster and Deepwell [38]. Assuming a high level perspective, related work by Beetham [40] notes the potential for successful embedding of learning technology to occur when the development approach is found to pursue both institutional expertise and infrastructure. Such an approach is typified by an institutional focus on developing expertise in learning technology (e.g. staff skills, student skills, resources and collaborations, etc.) and a focus on institutional infrastructure (e.g. investment in ICT management and infrastructure, learning technology support, appropriate administrative systems and a learning technology strategy). Beetham [40] therefore provides a list of “ingredients” which are known to be present in successful learning technology implementations and - like Lisewski [35] and perhaps owing to the immaturity of the area - stops short of proposing a more detailed exposition of how these ingredients might best contribute to institutional embedding.

More detailed research and theoretical work undertaken by Collis and her colleagues [41–44] has resulted in the generation of the 4-E model [44]. In this model, the likelihood of learning technology adoption and acceptance is considered to involve four variables: *educational effectiveness* (e.g. perceived or expected), *ease of use* (e.g. system efficacy, user experience, etc.), *engagement* (e.g. the confidence that the individual himself feels with respect to the technology use), and *environment* (e.g. referring to the organisational culture, conditions and climate). A vector model has been developed by Collis et al. [44] to accompany the 4-E model and its accuracy has been largely validated [43]. Their model provides a useful summary of the domains critical to implementation success; however, its use appears to be optimised for discrete technologies [44] and is less concerned with holistic organisational systems such as C-CAP.

2.2 C-CAP and embedding: system and institutional context

The current system context for C-CAP embedding is advantageous.

- Technically deficient systems, or systems that fail to meet basic ergonomic requirements, frequently inspire user resistance [27], [45], [46], [15]. Collis et al. [43] also note the importance of system efficacy and user experience in successful implementation. PiP evaluation activity surrounding C-CAP found high levels of system usability [33]. Heuristic evaluation [47], user acceptance testing [33] and user feedback [32] has also resulted in significant improvements in system performance, interface design and overall user experience.
- As noted in section 2.1, participative design strategies are often considered an important factor in successful system implementations [14], [19], [23], [24]. C-CAP development has exemplified participative design elements throughout its development lifecycle, partly owing to the incremental and agile systems development process demanded by technology-supported curriculum design [48]. Subsequent evaluation strategies [32], [33] and piloting [32] has provided users with early exposure to C-CAP and an opportunity to feed directly into its development.
- Small scale projects in which a new system is piloted is cited as a useful mechanism for debugging “real world” issues [25], winning early adopters or change agents [18], and are critical to models of technology diffusion [49–51]. Successful small scale piloting of C-CAP within the HaSS [32] has facilitated further system debugging and acquainted some stakeholders with the system.

The institutional context within which embedding is expected to occur is less favourable.

- Even in the most participative implementation approaches, management support for a new system is considered essential for success [18], [25], [30], [34]. Even within the Institutional Approaches to Curriculum Design Programme [8], projects such as Supporting Responsive Curricula (SRC) [52] has cited the importance of senior university management support in expediting system embedding and curriculum change [53], [54]. Though there is general support from faculty managers for C-CAP's introduction, this support has been limited owing to competing priorities or inertia (as defined by Keen [26]). The C-CAP embedding team has no influence over University faculties and uptake has not been mandated by University management, nor by senior faculty management. Successful and complete embedding is further complicated by the numerous stakeholders that require coordinating (i.e. including four faculties and three professional service directorates).

This context can be formalised more accurately using Keen's [26] scenario-writing template. Based on Bardach's [55] work within the area of "implementation games", Keen's [26] seminal work presents a customised scenario-writing template for systems implementation based on his concept of "games", i.e. counterimplementation tactics often used to resist, impede or wreck system implementation. Though the term "game" suggests - and includes - deliberate tactics that might be used to derail projects; Keen acknowledges that some games are subliminal, emanating from the wider social inertia that can pervade organisations. Keen's template provides a useful means of identifying risk areas of the embedding strategy that could be subject to gaming behaviour. The template helps to identify the nature of those games should they arise and, in turn, enables "countercounterimplemention" (CCI) strategies to be considered early in the implementation lifecycle. The implementation scenario characterising C-CAP embedding is set out in Appendix A and is categorised into the following areas: basic objectives, dilemmas of administration, (implementation) games, delay and "fixing" the game. The resulting implementation scenario has informed the formulation of the embedding plan.

2.3 Embedding aims and scope

The embedding phase seeks to achieve a number of broad aims. These can be identified as follows:

- Establish an effective governance structure to facilitate the management and leadership of C-CAP embedding
- Continue advocacy, training and user support for teaching staff, faculty academic quality (AQ) teams, and other relevant stakeholder groups
- Promote faculty engagement with C-CAP and increase active use of C-CAP across the University of Strathclyde
- Undertake technical enhancements to C-CAP
- Explore further integration with University corporate systems
- Align C-CAP with objectives of KIS project where appropriate and feasible

The embedding plan documents the principal elements and objectives (e.g. tasks, activities, actions) of the embedding strategy required to meet these broad aims and provides a plan for their implementation. This includes those elements germane to engaging stakeholders and departments, training, cultural initiatives, etc. as well as those steps that are required to secure timetables for stakeholder involvement, strategies for responding to implementation games, etc. Significant outstanding development work, as well as actions arising from the PiP Final Evaluation Report (WP7:40 Project evaluation synthesis), are also included [9].

The plan is divided into five sections, each defined as follows:

- Outreach and recruitment: Objectives and activities pertaining to the recruitment of participating faculties, advocacy activities, identification and recruitment of champions and "change agents", etc.
- Awareness and impact: Principally concerned with end user training activities, user support services, broadening academic quality support via C-CAP, etc.
- Technical development: Plan for managing future C-CAP development, improving integrations with corporate systems, increasing system functionality and user experience, etc.
- On-going evaluation: Plan for improving data collection for process surrounding curriculum design and approval, strategy for organisational monitoring of C-CAP impact, strategy for continuing participative system design philosophy, dissemination activity, etc.
- Action recommendations: Summarises the plan and strategy for addressing PiP evaluation recommendations [9]. These recommendations span a number of disparate areas of activity.

2.4 Risks and responsibilities

Most dependencies and risks are highlighted in the embedding plan; however, it is worthwhile summarising the principal responsibilities and risk areas since some are overarching and are omitted from the plan. Figure 1 summarises the essential components of institutional embedding and the responsibilities of stakeholders within the C-CAP curriculum design and approval process.

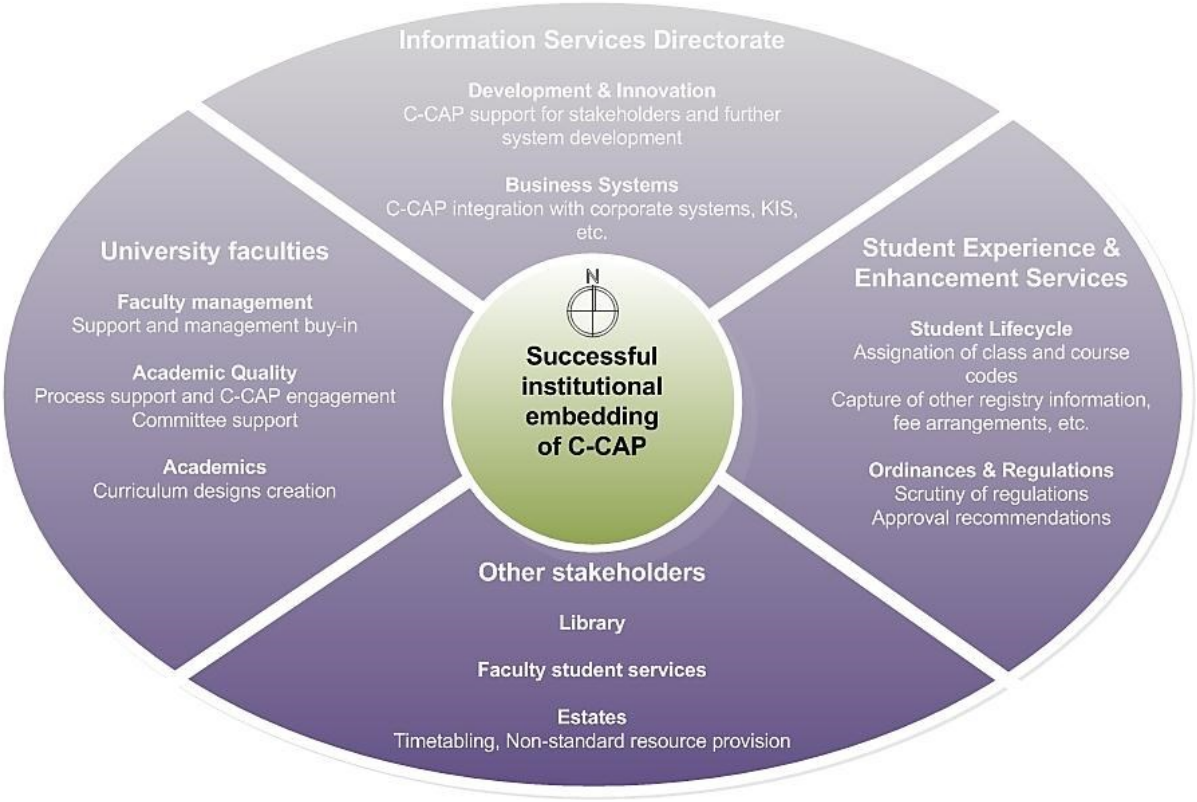

Figure 1: Summary of essential components (listed within each of the cardinal directions) for institutional embedding of C-CAP.

Achieving successful institutional embedding of C-CAP - as represented at the centre of the ellipse - therefore entails engagement from the stakeholders within each of the cardinal directions (N, E, S, W). North, East and West includes numerous primary and key stakeholders and are therefore essential to embedding success. This is manifest in their listed responsibilities, all of which are essential to the operation of curriculum approval processes. Though institutional embedding should ideally involve all cardinal directions to ensure effective embedding and maximum institutional impact, embedding can

still enjoy a measure of success if South (Other Stakeholders) are unable to engage. South contains secondary stakeholders and – although their need for design and/or approval information is important – their interaction with the system is passive and not critical to curriculum design or approval.

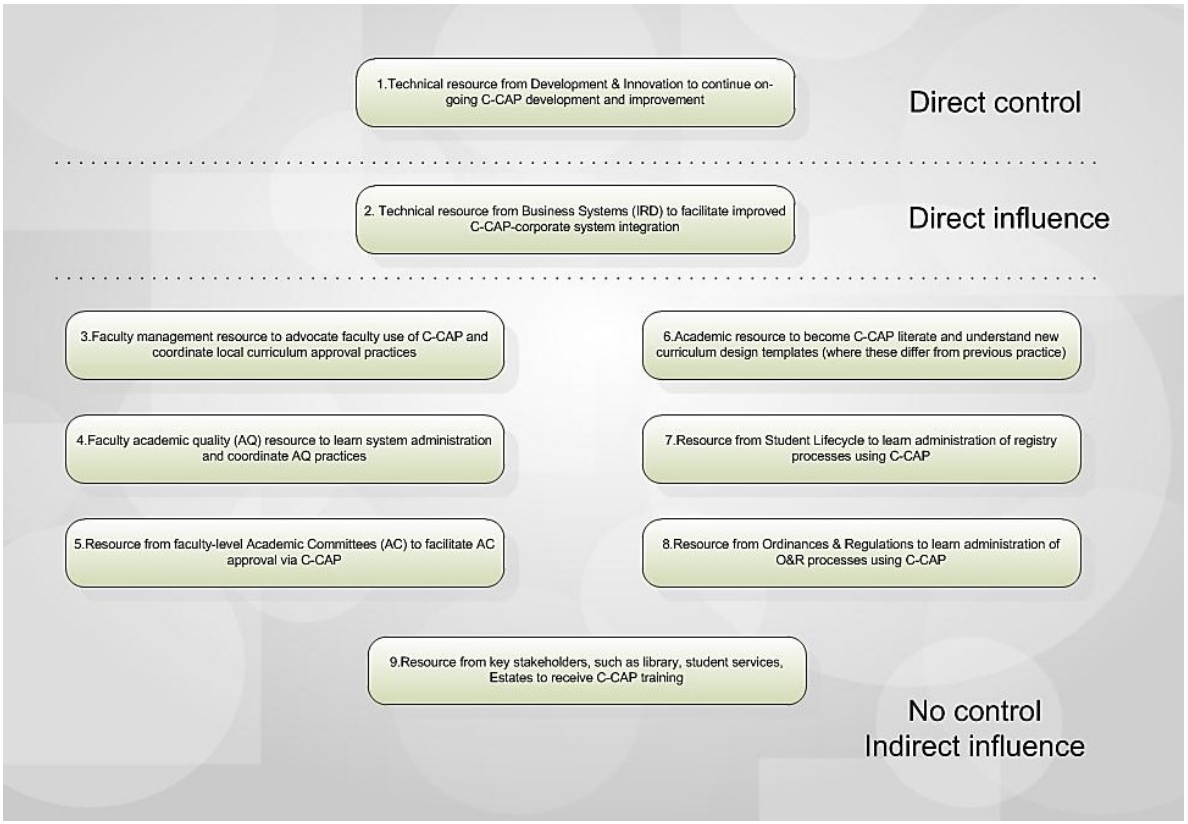

Figure 2: Nine key resources critical to embedding success, as highlighted by Keen's [26] scenario-writing template,

The responsibilities of particular stakeholders and the dependencies they create for successful embedding can be more accurately viewed in Figure 2. The scenario-writing process (Appendix A) highlights nine key resources that are critical to embedding success. These resources are listed and diagrammed in Figure 2. Most resources are not under the direct control or influence of the C-CAP team; only indirect influence can exerted to command these resources. Direct control and direct influence are only available in the technical development of C-CAP and better corporate systems integration respectively.

3. Embedding strategy and plan

3.1 Outreach and recruitment

1. Outreach and recruitment	Brief description of activity	Dependencies and risks	Task responsibility
1.1. Securing top-level education strategy support **Deadline: mid-November 2012**	**Recruit the Head of Education Strategy from the Directorate of Strategy & Policy as a "high-status" C-CAP champion.** The embedding literature highlights the importance of senior, high-status champions or actors in inspiring system change [18], [25], [30], [34]. Such actors bring "credentials, references, professional appearance and top management support" [18] as well as "political clout and legitimacy" [25]. Keen [26] also notes the importance of including policy actors in the change process. The Head of Education Strategy in the newly formed Directorate of Strategy & Policy assumes a critical role within the University of Strathclyde for directing strategy within areas pertaining to education and learning enhancement. Her high-level involvement as an advocate of C-CAP will ensure C-CAP features as a strategic priority for faculties.	**High-status recruitment** High-status support from the Head of Education Strategy is dependent upon her recruitment. Recruitment may also mitigate the lack of change contract, important to successful CCI. **High-status risk** Since the Directorate of Strategy & Policy has only recently been formed, the Head of Education Strategy may be unable to dedicate the time to function as a successful champion initially.	C-CAP team
1.2 Faculty outreach activities **Deadline: mid-December 2012**	**Outreach activities to be organised, designed to communicate a "vision" of C-CAP and its benefits to faculty management (including academic quality (AQ) and Vice-Dean (Academic)) and wider faculty staff (i.e. academics).** This activity is designed to support faculty recruitment (below) but will entail the use of faculty management (in the first instance) and faculty-wide (in the second instance) advocacy sessions, in which system background, benefits, success under evaluation, etc. are communicated. A demonstration of basic C-CAP functionality will also be provided. The "vision" of C-CAP will be communicated via faculty-wide sessions assuming a mandate for change has been secured from faculty management. In a survey of system implementation case studies, Rousseau [25] found "vision" to be an important component of successful implementation. This involves communicating the vision of the proposed change and the potential impact of the new system on staff, i.e. "what will the new system look like?" Incremental change is de rigueur in most system embedding strategies [20], [26], [29], [30]. Time is also critical [18], [25], [35]. Early notification of change therefore provides staff with an opportunity to prepare psychologically for the change [25] and can mitigate "energy dissipation" games that may accompany abrupt systems introduction.	**Faculty management** "First instance" outreach is dependent upon faculty management agreement; **Faculty recruitment** "Second instance" outreach is dependent upon faculty recruitment (1.3). (See also deadline note in 1.3) **Lacking change contract** In his CCI strategies, Keen [26] highlights the importance of having a "contract for change". Whilst C-CAP embedding lacks such a contract, these outreach activities should contribute towards the fulfilment of Keen's other CCI tactics: cop-opt users early.	C-CAP team
1.3 Recruitment meetings	**Recruitment meetings to be pursued with faculties, at which C-CAP's introduction can be discussed, negotiated, faculty obligations delineated and**	**Faculty management agreement**	C-CAP team

Deadline: end-November 2012 **Note:** To ensure short-term wins, attempts to recruit faculties will conclude at end-November 2012. Recruiting faculties after this date would be result in little or no time for faculty embedding, particularly given the cyclical nature of curriculum design and timetable of Academic Committee approval. It would also divert resource from supporting those faculties that are committed to C-CAP embedding prior to end-November.	**participation agreed. Such recruitment meetings will seek to gain formal agreement from faculties to deploy C-CAP.** Successful embedding of C-CAP can only occur with the recruitment of faculties, accompanied by firm faculty level support. As per the scenario-writing, faculties exercise "monopoly interests" [26], [55] within the area of system use and in the information flow of curriculum designs, i.e. a "data monopoly". Without their recruitment and support, the implementation and embedding of C-CAP cannot proceed. Even if faculty recruitment is successful it may in fact be tokenistic in practice and may demonstrate aspects of *energy dissipation gaming* (e.g. "tenacity" and "odd man out") [26] (see Appendix A). Faculty participation therefore needs to be successfully communicated to academic staff (as per 1.2 and 1.4) [24] otherwise user resistance may emerge, e.g. poor take-up, low usage, low flow of designs, etc. Additional adoption drivers include C-CAP's relationship to fulfilling KIS requirements [25]. KIS also provides a mechanism by which to inspire a wider cultural change in the creation of curriculum information, i.e. feeding into national imperatives . Personnel critical to successful faculty recruitment includes *faculty management*, *faculty academic quality* (AQ) and the *Vice-Dean (Academic)*. Without proper faculty commitment, C-CAP will not become the principal means of designing and approving new curricula and stakeholders will consequently not receive the information / data therein.	Recruitment of faculties critical to embedding success and entirely dependent upon faculty management agreement. Failure to secure faculty agreement will result in low institutional take-up of C-CAP. **Game risks** *Energy dissipation* gaming presents a risk, even if faculties are successfully recruited. This may delay and/or stymie progress and project activity. Recruitment meetings will seek to secure firm agreement from faculties regarding their obligations to discourage "odd man out" gaming. Advocacy, local champions (1.4 below) and face – to - face interactions (highlighted as an important CCI tactic [26]) with key personnel to ensure "tenacity" is minimised.	
1.4 Local champion recruitment **Deadline: mid-November 2012**	**Identify and recruit at least one local C-CAP champion within each participating faculty.** Local champions would preferably demonstrate technical efficacy with C-CAP but would also demonstrate an holistic understanding of C-CAP's purpose for both curriculum design and approval. They would also provide a mechanism for fluid communication between participating staff and the C-CAP team. The importance of local technology champions or "change agents" was noted in section 2.1. Such local champions are particularly important to establish patterns of behaviour that can lead to successful change (i.e. change agent) [18]. They are also important in articulating the benefits to end user staff [38] and, as we noted, may be better placed to understand and articulate the relevance of the new system within the specific cultural groupings [35], [36]. This approach has been cited as an important ingredient in a number of information system and e-learning technology embedding strategies [24] [18], [34], [38]. Suitable change agents in this instance may include lecturers or, if possible, Vice-Dean (Academic)s; although it should be noted that successful change agents need not have high status or legitimate power [18]. Alternative change agents or champions, such as members of AQ, may therefore be considered extremely useful owing to their centrality in the curriculum approval process (i.e. at centre of star-shaped model of curriculum approval) [32].	**Local champion recruitment** Success with the change potential of local champions is predicated upon the assumption that the C-CAP team can successfully recruit. **Local champion risk** This activity entails a measure of risk since it is predicated upon the assumption that willing champions are available at each participating faculty. Given the importance ascribed to local champions / change agents in the implementation literature, failure to recruit would make the following embedding threats more likely: • Failure to interpret cultural nuances during implementation • Failure to articulate benefits of C-CAP to all academic staff • Lack of local support for communicating C-CAP changes to staff, feeding back user experiences, responding quickly to resistance, cop-opting users early, etc. The effects of failing to recruit could be alleviated via aggressive training (2.1) and additional outreach activities (1.2).	C-CAP team

1.5 Recruitment of course coordinator "super users" **Deadline: mid-November 2012**	**Identify and recruit course coordinator "super users" within participating faculties.** Like faculty champions (1.4), the course coordinator "super users" would preferably demonstrate a level of technical efficacy with C-CAP; but their role would pertain more to advocating the system in curriculum design activities related to courses within their remit.	**"Super user" recruitment** The additional advocacy support promised as a result of "super user" recruitment is predicated upon the assumption that the C-CAP team can successfully recruit. **"Super user" risk** Recruitment could prove difficult if local champions already exist. Curriculum approval is also a faculty level process which does not recognise course groupings, thus making the relevance of course coordinator "super users" moot.	C-CAP team

3.2 Awareness and impact

2. Awareness and impact	Brief description of activity	Dependencies / risks	Task responsibility
2.1 Targeted training support for teaching staff and others **Deadline: end-April 2013**	**Delivery of C-CAP targeted training activities for academic staff and others.** Staff training is central to participative embedding strategies [18], [21], [24–26], [29], [34], [35], [38], [39], [45]. Training can mitigate user resistance [14] by increasing users' system efficacy and confidence, thereby promoting adoption. Sharpe also notes the importance of training that is not abstracted from the workplace [34], i.e. presenting options for "learning-in-working as an occupational necessity". The following facets will therefore characterise training for teaching staff: • General C-CAP induction sessions, at which general C-CAP functionality is demonstrated to staff, e.g. tutorial, lab, etc. • Targeted one-to-one training sessions with staff, e.g. office "home visits" to staff. These will be offered throughout the embedding period Staff not only require the psychological time to grow accustomed to the idea of a new technology, but they also require sufficient time to develop confidence in using the system, e.g. "time and space" [18], [35]. For this reason one-to-one training will be offered through the embedding phase to accommodate those staff who may have received "abstracted" training [34] but require additional support when engaging in the "real world" task of designing curricula. Although academic / teaching staff represent that largest group of C-CAP users requiring training, there are staff within a variety of key stakeholder groups (e.g. library, Estates, Student Lifecycle, O&R, student services, etc.) that will also require training: • Targeted one-to-one training sessions with key stakeholder staff, delivered as "home visits" using dummy proposals to simulate approval process.	**Synergy between outreach and training** Successful training is dependent upon successful outreach activity (1.1) and faculty recruitment (1.2). Such outreach work aims to advocate C-CAP and communicate its benefits, success under evaluation, etc. This activity is also the principal mechanism of alerting the user community to C-CAP and inspiring interest in the system. It is for this reason that it will ergo determine staff take-up of training opportunities. Target training will nevertheless perform an important role in seeking out system resistance and co-opting users early [26]. It will also offer an opportunity to build personal credibility with users [26].	C-CAP team
2.2 "Power user" training and support for academic quality teams **Deadline: end-April 2013**	**Delivery of C-CAP "power user" training and support for faculty AQ teams.** AQ staff are singularly responsible for administrating and managing faculty level curriculum approval processes and therefore have responsibility for tracking, providing on-going feedback, controlling the status of proposals, assigning proposals for academic review, etc. Academic quality staff govern or mediate key decision points during the approval process. Administering this functionality exposes quality staff to an extra layer of C-CAP system complexity which no other end users experience [9], [32]. AQ teams will require specialist training owing to their extra technical burden. The following facets will therefore characterise training for AQ team members: • General C-CAP "power user" induction sessions delivered to AQ team members	**Synergy between outreach and recruitment and training** Successful AQ team training is dependent upon successful outreach activity (1.1) and faculty recruitment (1.2). **Engagement and division of labour risk** A minor risk is a lack of engagement from those AQ team members who consider C-CAP administration outside their job role. Anecdotal evidence from piloting C-CAP in the HaSS Faculty (March – May 2012) suggests that AQ teams do not share in task completion, e.g. one team member completes class related	C-CAP team

	• One-to-one sessions with all AQ staff, using "dummy" proposals and the C-CAP "Sandbox" to simulate the management of a bona fide curriculum review and approval scenario (making use of process and workflow maps – see below) • Circulation of process and workflow maps to aid management of curriculum approval milestones Additional support will be facilitated via: • Fluid communication channels between AQ and C-CAP teams, established via a nominated AQ contact, with whom system issues can be relayed (and vice versa) • Meetings with AQ staff every two months to discuss embedding progress, difficulties, etc. • Delivery and of AQ specific training resources (tutorials, videos, etc.) via the University Development & Training Gateway • On-going email and phone support	tasks, one completes course tasks, etc. To ensure process reliability and a reduction in Transition Delay Risks (TDRs) (see WP7:38 – PiP evaluation activity [56]), all AQ team members should be equally equipped to administer C-CAP.	
2.3 Delivery of C-CAP user support services **Deadline: end-April 2013**	**Establishment of C-CAP user support services to scaffold user learning and solve user/technical issues.** Analyses of successful system implementations have found user support services – and its combination with targeted training – to feature prominently [25]. Such services include: • Email / phone support for user queries or system issues • Circulation of reference / training materials, and • Making implementation staff available for brief "home visits" for those staff experiencing issues unresolvable by the aforementioned means, i.e. in-person drop in support [57]. Since most system issues or user queries are likely to be simple to resolve, training materials will not only form an important learning resource from which end users can develop their C-CAP skills, but the tutorials and the videos therein will form an important tool for users in self-diagnosing systems problems or satisfying user queries. Additional materials require creation to accommodate the newer features of C-CAP and the administrative functionality that was incomplete at the time the original materials were generated. Administrative mechanisms to log and prioritise email support and "home visits" (events). Such mechanisms will also make possible some level of cover should key staff be unavailable (e.g. to deal with urgent or catastrophic issues); though it is acknowledged that there is limited staff capacity for absorbing the entirety of such a task. • Updating C-CAP training materials to accommodate new system functionality and administrative processes • Creation of C-CAP support email account to which simple end user queries can be sent and thereafter resolved / in-person support scheduled	**Fulfilling user support** Though few dependencies exist to deliver the support services described, a minor risk is the C-CAP team's inability to service a high volume of events. The volume of events should be monitored and trended during the first month of faculty implementation. Since it should be assumed that high event numbers (from specific faculties) indicates poor user efficacy, further targeted staff training (2.1) should be organised and administered.	C-CAP team

	• Create administrative mechanisms (e.g. SharePoint list) to support the logging of user issues (and ergo their resolution) and/or schedule in-person support.		
2.4 Working with AQ teams to develop curriculum support via C-CAP **Deadline: end-April 2013**	**Promoting, advocating and developing C-CAP as a suitable vehicle for delivering curriculum support and AQ advice.** Involvement of primary stakeholders in aspects of on-going systems development is a frequent element of participative implementation approaches [14], [25]. An area that would benefit from participative development and would support long term embedding is the promotion of C-CAP as a one-stop-shop resource for all matters pertaining to curriculum design and academic quality. Such an approach envisages AQ teams assuming greater ownership over the maintenance of the information / resources C-CAP serves, rather than merely administering the system. Such use may also promote greater advocacy from AQ in their capacity as local champions or change agents, i.e. because they are more invested in its development and on-going maintenance. Several activities would be required to facilitate this: • Advocating and promoting C-CAP as a general source of curriculum and academic quality information. Use of C-CAP in this manner infers a second level of recruitment (i.e. system use is venturing beyond curriculum design and approval processes). Central to this activity is therefore securing agreement from AQ teams that they are willing to proceed. • Assisting AQ teams to develop new materials or guidance (or modify existing materials) for delivery / publication via C-CAP • Where appropriate, enabling AQ team members to update materials on C-CAP and administering the relevant training. This may include the production of relevant training materials for these staff.	**Recruitment dependency** The ability to work with AQ teams to develop the noted strategy is clearly dependent upon 1.1 and 1.2. **Persuasion risk** Although anecdotal evidence suggests faculty AQ teams are open to C-CAP implementation and in improving curriculum approval more generally, the implementation of any system is inherently political [21], [27], [31], [35]. New systems can disrupt existing job roles and redistribute power, consequently fostering system resistance [18]. It is therefore possible that whilst AQ teams are willing to participate in the administration of C-CAP (a role which affords them relative power within the approval process), they may be less willing to publish guidance which has historically been delivered via email or verbally, since to do so would reduce their perceived power and influence. It may also be perceived to reduce their longer term importance within the faculty. Success – and mitigating this risk – will therefore require AQ team members to feel invested in – and in control of - the development of this aspect of C-CAP. Enabling AQ team members to engage with content on C-CAP will form an important part of this.	C-CAP team

3.3 Technical developments

3. Technical development	Brief description of activity	Dependencies / risks	Task responsibility
3.1 Management of C-CAP development list **Deadline: end-March 2013** **Note:** end-March deadline required thereby providing a month (to end-April) in which development list items can where feasible / appropriate be implemented.	**Prioritisation and implementation of C-CAP development list.** C-CAP piloting and evaluation during the PiP development phase exposed an extensive range of technical improvements, fixes and system "rules" that should be implemented. These are currently recorded in the C-CAP development list; but their implementation is limited by the resource available to action them. These improvements and fix tasks therefore require: • Investigation to ascertain improvement feasibility • Prioritisation or fixes and improvements, owing to limited resource; prioritisation will in the first instance be given to those changes that will improve system performance for key and primary stakeholders • Assigning to technical team members for completion Periodic C-CAP team meetings will be organised to monitor development list progress.	**Limited technical resource** An on-going dependency and potential risk relates to the amount of technical resource available. Many of the tasks featuring on the development list could be described as low priority. Given the limited technical resource available, it is possible that some of the lower priority tasks may not be completed within the desired timeframe owing to other technical commitments.	C-CAP team
3.2 Improving integration with corporate systems **Deadline (identification): end-March 2013** **Deadline (implemented): end-April 2013**	**Improving C-CAP integration with other corporate systems.** C-CAP offers many opportunities for incorporating data from other corporate systems; but it arguably also provides greater opportunities for sharing data with other systems. The original PiP technical architecture envisaged a self-contained curriculum design approval system with loose coupling to other corporate systems [48], [58], [59]. The embedding phase should therefore: 1. Backfill C-CAP with basic data from KIS to create data stubs 2. Explore pushing C-CAP data germane to the Key Information Sets (KIS) [60] to the University of Strathclyde KIS service for harvesting by the Unistats website [61] 3. Investigate pushing relevant curriculum data to registry systems, e.g. class catalogue., thus improving process efficacy as per WP7:39, i.e. improved Activity Automation Factor (AAF) and reduction in Person Dependency Factor (PDF) [56] 4. Sending data on class activity, delivery and resource requirements to timetabling systems, e.g. inserting early placeholder activities, mechanisms to facilitate communication between academic (lead) and faculty management, and timetabling to clarify requirements. 5. Explore C-CAP interaction with MyPlace. Improved interaction with MyPlace has emerged as a notional aim at PiP Steering Group meetings and in discussions with the Education Strategy Committee [62]; however, the objectives of such integration remain ephemeral and require further clarification with the Learning Enhancement Team.	**Other systems and staff commitments** This objective – and its sub-objectives – is entirely dependent upon on systems that fall outside Development & Innovation control. Integration with other systems may also involve negotiation with stakeholders from other directorates. For this reason all noted tasks are exposed to delay risks, e.g. stakeholder priorities, commitments, etc.	C-CAP team Business systems

	• Of the items above, **#1** is accompanied by an implementation objective and should be achieved by the end of the embedding phase. • Items **#2** and **#3** are exploratory and investigative; but efforts should be made to liaise with relevant stakeholders and map out the technical requirements so that their implementation can begin after the embedding phase concludes (end April 2013). • Item **#4** is also exploratory, but is principally concerned with scoping the opportunities for MyPlace enhancement using C-CAP data. Engagement with the Learning Enhancement Team will be central to this task. The outcome of discussions will be documented to provide technical objectives for C-CAP after the embedding phase (scheduled to end in April 2013).		
3.3 Improving system and user experience **Deadline: end-April 2013**	**Improving system performance and user experience in line with evaluation findings and user feedback.** PiP evaluation activity exposed a number of areas in which C-CAP performance could be improved. These areas can be separated into system / process [32], [56] and user experience [33], [47]. • Address proposed system / process improvements, as detailed in WP7:38 [32] and WP7:39 [56] • Address proposed user experience improvements, as detailed in WP7:37 [33], [47] and WP7:38 [32] Note that some findings from WP7:37 were implemented prior to C-CAP piloting (March – May 2012). On-going evaluation activity (see Section 3.4) and feedback gathered from user support services will also inform activity in this area. This approach to on-going evaluation and development is in line the agile, incremental systems development methodology which has been used throughout the PiP Project and which has been found to be essential in tech-supported approaches to curriculum design [48].	**Limited technical resource** An on-going dependency and potential risk relates to the amount of technical resource available to action these improvements. For example, objectives 3.1 and 3.2 require significant technical resources and are arguably of a higher priority than 3.3. **System / process change risk** Some of the system improvements detailed in WP7:38 [32] and WP7:39 [56] will result in improvements to system efficacy which, in turn, will improve process efficacy. For this reason the system changes may influence underlying approval processes. Such changes will therefore require consultation and negotiation with stakeholders which may delay their implementation.	C-CAP team
3.4 Identifying – and where possible implementing - additional C-CAP functionality **Deadline: end-April 2013**	**Exploring areas for improving or offering new C-CAP functionality.** It has been acknowledged that C-CAP is not a static system [48]. Options for new or additional functionality should continue to be explored, e.g. functionality to enable the simple reuse of existing curriculum designs as templates, date picker tools to AQ staff to set up review deadlines / notifications, XRCI feeds [63], etc. This objective is difficult to define owing to its open nature. The following tasks can nevertheless be identified: 1. Recommendations for new functionality to be recorded in SharePoint list as embedding continues	**Limited technical resource** Once again, an on-going dependency and potential risk relates to the amount of technical resource available to implement new functionality. For example, objectives 3.1, 3.2 and 3.3 are a priority since they seek to improve current system performance. However, no such dependency exists for tasks 1 – 3.	C-CAP team

	2. SharePoint list to be the subject of C-CAP team meetings / discussions where new functionality and ideas are brainstormed and discussed 3. Create a C-CAP user suggestion mechanism to gather data on the kind of functionality end users would like to see added to C-CAP. Such a list should also help to prioritise new C-CAP developments 4. New functionality and its implementation to be prioritised or jettisoned accordingly		

3.4 On-going evaluation

4. On-going evaluation	Brief description of activity	Dependencies / risks	Task responsibility
4.1 Improving data collection surrounding approval process efficacy **Deadline: mid-November 2012**	**Improving data collection surrounding approval process efficacy.** WP7:39 noted some of the difficulties in evaluating the impact of process improvements when few performance indicators are gathered by faculties about the "previous state" [56]. To monitor the longer term impact of C-CAP on approval process efficacy there is a general requirement to increase quantitative data collection on the performance of the approval process so as to improve future process monitoring [9]. The comparative potential of analysis techniques such as Pareto can be optimised if data were collected over defined temporal periods, with each period exposed to specific process changes or improvements, thereby facilitating "before and after" analysis. Subsequent data collection using C-CAP (i.e. under the "new state") is therefore required to enable the monitoring of process improvements during the faculty embedding of C-CAP. In line with the above noted need to improve process monitoring, activity should also attempt to verify the extent to which the process improvements identified using structural metrics [56], [64] are reflected in the "real world" implementation of C-CAP. This objective is characterised by the following activities: • Consultation with faculty AQ teams to negotiate their involvement in data collection • Formulation of suitable and reliable data collection mechanisms for the capture of Pareto data • Delivery of brief induction sessions to AQ teams to explain the nature of the data, its importance and how the data collection tool should be used • Monitoring and analysis of "new state" Pareto data (including comparison with "previous state" data) • Interpretation of data and formulation of system or process improvement recommendations and sharing of findings with AQ teams	**Data collection dependency and risks** Achieving this objective is largely predicated upon the assumption that: • Recruited AQ teams will be willing to participate in the collection of approval process data. • AQ teams exercise a data monopoly risk [26], since only AQ teams are in a position to collect this data • AQ teams will – assuming suitable data collection mechanisms can be delivered – collect and report data reliably To minimise data collection risks, those AQ teams that are successfully recruited to participate will be encouraged to meet with the PiP Project Evaluator to receive a brief induction session on the nature of the data, its importance and how to use the data collection mechanism.	C-CAP team AQ teams
4.2 Organisational impact monitoring **Deadline: mid-March 2013** **Note:** mid-March 2013 deadline identified to provide circa one month to analyse / write up findings and recommendations.	**Data collection to monitor the organisational impact of C-CAP.** PiP evaluation activity found the need for improving the mechanisms used for observing change within stakeholder groups in order to monitor and assess the longer term "human" impact of C-CAP. The periodic use of the Most Significant Change (MSC) approach [65], [66] would be one such mechanism owing to its suitability in organisational contexts and its ability to capture secondary outcomes, such as those of personal significance to stakeholders. This objective is therefore characterised by the following activities:	**Data collection dependency and risk** MSC stories have been proven to be difficult for participants to articulate, primarily owing to the higher-order skills that are required to provide a "good" story (e.g. the reflective skills) [67]. They also note the problems participants have in deciding which stories are "significant" and worthy of reporting. Story collection is dependent upon willing participants. Several risks also present themselves: • Stakeholders will be unwilling to provide MSC stories, either because	C-CAP team End users

	• Formulation of mechanism to facilitate large-scale gathering of MSC stories from stakeholders in participating faculties and professional services • MSC story gathering • Filtering and analysis of selected MSC stories, categorised by stakeholder group • Interpretation of "winning" stories to better understand C-CAP impact and to inform future system development.	are averse to participation or because they find the story recording process to be cognitively onerous • Stakeholders have difficulty identifying suitable stories to report In their MSC guide, Davies and Dart [66] recommend extended periods of story collection. Such periods are recommended to span a year, during which stories might be collected every three months. The embedding phase is expected to last 8 months during which recruited faculties will be using C-CAP extensively. A period of MSC story collection three months after initial implementation is therefore considered appropriate, with three months for stories to be recorded.	

4.3 User evaluation to steer incremental systems development methodology
 	
Deadline: mid-March 2013
 	
Note: mid-March 2013 deadline identified to provide circa one month to analyse / write up findings and recommendations.
	User evaluation feedback to inform incremental systems development methodology.
	
	User acceptance testing [33] and piloting [32] during the PiP development and evaluation phase gathered rich feedback on users' experiences of C-CAP interaction. Further user feedback – gathered after users have been exposed to C-CAP in "the wild" and for extended periods of time – is essential to evaluate current system performance.
	
	• Survey circulated to stakeholders (via either Bristol Online Surveys or Qualtrics), to include:
	  ○ A customised version of the standard System Usability Scale (SUS), first proposed by Brooke [68] and subsequently developed, deployed and validated by other usability researchers (e.g. [69–72])
	  ○ Bangor et al.'s [69] Adjective Rating Statement (ARS) to provide a qualitative response that can be used in combination with the SUS score to better interpret participants' overall experience of C-CAP
	  ○ C-CAP perception questions, e.g. how C-CAP supported them in the curriculum design process and its potential for improving approval processes at the University of Strathclyde. (Synergy with objective 3.4, i.e. opportunity to canvas ideas for future C-CAP functionality)
	• Focus group with key and primary stakeholders to be held in February 2013 with the objectives of:
	  ○ Assessing extent to which C-CAP effected change within institutional processes
	  ○ Eliciting and capturing data and evidence of the nature of change, efficiencies, outcomes, attitudes, etc.
	  ○ Nature of identified changes across stakeholder groups (e.g. patterns, discords, synergies, etc.)
		Participant response risk
		To mitigate a low response to a survey, local champions (1.3) will be used to circulate the survey. Local champions will also be used as the principal channel for recruiting focus group participants.
			C-CAP team
			End users

4.4 Dissemination activity **Deadline: end-April 2013**	**Disseminate PiP Project outcomes and outputs to the wider professional and academic communities.** An additional objective of the embedding phase and an expectation of the JISC is the wider dissemination of PiP Project activity and its principal technical output: C-CAP. Dissemination activity within the current embedding phase should entail: • Publication (or acceptance of publication) of three dissemination outputs, e.g. conference or journal papers. Such outputs are expected to focus on the overall technical approach to tech-supported curriculum design and approval, the evaluation methodology deployed during PiP, the organisational impact of tech-supported curriculum design, institutional and organisational behaviour issues. • On-going maintenance of the PiP website and, in particularly, the PiP Blog. The Blog is expected to continue to disseminate issues pertaining to the institutional embedding of tech-supported approaches to curriculum design and approval.	**Time management risk** There are no bona fide dependencies associated with this objective. Most theoretical or evaluative work was completed prior to the embedding phase; however, preparing manuscripts (i.e. "writing up") for publication is time consuming and will require significant resource to deliver. It therefore presents a delivery risk. Dissemination is expected by the JISC and for this reason this activity should be prioritised. Project management should ensure that adequate time is dedicated to fulfilling the dissemination tasks and ergo the objective.	C-CAP team
4.5 JISC reporting **Deadline: end-April 2013**	**Produce and submit brief report to JISC on embedding phase.** JISC expect the submission of a brief embedding report, documenting the activities undertaken during the embedding phase, notable developments, lessons learnt and recommendations for other HE institutions. Report to be drafted from mid-March 2013 and submitted to JISC. Report should cover the following broad areas: • Activities undertaken (in relation to embedding strategy) • Institutional impact • Lessons learnt and recommendations • Future of C-CAP at University of Strathclyde • Dissemination activity	This is objective is an essential component of the embedding funding and must be delivered. There are no known dependencies or risks.	C-CAP team

3.5 Action recommendations

5. Action recommendations	Brief description of activity	Dependencies / risks	Task responsibility
5.1 Develop C-CAP "best practice" guidance for AQ teams **Deadline: By penultimate Academic Committee of participating faculties; to be tested at ultimate.**	**Develop C-CAP best practice guidance for AQ teams to best manage AQ activities and optimised C-CAP impact.** PiP development work improved the quality of guidance materials made available to academics during the curriculum design process; however, evaluation activity found that many aspects of the approval process lack the same level of guidance [9]. WP7:40 [9] recommended that future work should also seek to establish C-CAP "best practice" guidance to ensure key change agents (such as AQ teams) maximise the effectiveness and impact of C-CAP. This orientation would better assist those responsible for the administrative management of the curriculum approval process and would contribute towards improved system acceptance levels during future embedding of the system. Specifically, this objective entails the following: • Drafting best practice guidance and/or recommendations on the best management curricula within C-CAP. To include the use of C-CAP in approval processes sitting outside C-CAP, e.g. use of C-CAP at academic committees • Circulation of guidance to AQ teams and, where relevant, committee chair(s) • Mechanisms to enable AQ teams to feedback and reflect upon their experiences of using C-CAP for those processes outside the system	**AQ feedback dependent on C-CAP use** PiP evaluation activity identified areas where C-CAP use was not optimised [9], [32]. This work noted that the best way of using a new technology is not always immediately evident to new users. Best practice guidance should therefore help to resolve this, and evaluation activity provides a basis for such guidance; however, the success of guidance is dependent upon faculty participation and communication channels to enable teams to suggest modifications to guidance. **Faculty specific risks** A potential risk is the inability to find common guidance across all faculties. At time of writing each faculty operates slightly differently.	C-CAP team AQ teams Academic Committees
5.2 Investigating feasibility of additional process improvements **Deadline: end-April 2013**	**Investigating and documenting the feasibility of implementing further process improvements within C-CAP.** Analysis of the process improvements effected as a result of C-CAP's implementation enabled the identification of several process stages, or process activities, that could be further adjusted to improve overall process efficacy [56]. WP7:39 [56] recommended that all the structural metrics were worthy of revisiting to ensure the process C-CAP models is optimised. APF (activity parallelism), RIF (role integration) and PDF (person dependency) were highlighted as areas worthy of examination. On the basis of the improved process understanding made possible via the "real world" use of C-CAP: • Investigate the opportunities for further approval process improvements. This should include scoping and documenting the feasibility of their implementation • Process wide promotion of knowledge ecosystems to promote tacit knowledge transfer thus minimising PDF • Investigate higher levels of activity parallelism (APF) in post-faculty approval processes	**System / process change dependency and risk** Some of the process improvements detailed in WP7:38 [32] and WP7:39 [56] will improve process efficacy. For this reason the system changes may influence underlying approval processes. Investigating the feasibility of such changes will therefore require consultation and negotiation with stakeholders who may object to their implementation, e.g. job role issues associated with knowledge ecosystems. Although this objective is principally concerned with investigating feasibility of further process improvements, their eventual implementation may not be possible owing to the influence of regulations and institutional ceremony [56], [73].	C-CAP team Involvement from all stakeholders

5.3 Cross-faculty consistency in curriculum design practice **Deadline: end-April 2013**	**Promoting and facilitating cross-faculty dialogue on improving consistency in curriculum design practice.** System logic and guidance notes within C-CAP promote greater consistency in aspects of proposed curriculum designs and supports adherence to curriculum frameworks, e.g. Scottish Credit and Qualifications Framework [74]. However, there remains a need to clarify ad hoc design practices across the University of Strathclyde. This is required to render the process and its requirements more transparent to academics, but also to establish equitable learning pathways for students, particularly as radical differences in assessment practice and study hours allocation were found to exist during WP7:37, even within faculties [33]. • Formalise areas of curriculum design most subject to design variation • Discuss variations with faculty management / AQ teams with a view to establishing agreement on guidelines to be delivered via C-CAP It is likely that this objective should involve Education Strategy (perhaps Head of Education Strategy – Cathy Milligan).	**Faculty specific and strategy risk** A potential risk is the inability or unwillingness on the part of faculties to find common guidance on design practices. Additionally – although improving design consistency in C-CAP is important for its long term relevance – the C-CAP team has no influence over wider policy decisions vis-à-vis curriculum design or approval. It is hoped this risk can be mitigated by involving representatives from the new Directorate of Strategy & Policy.	All stakeholders Directorate of Strategy & Policy
5.4 Development of policies relating to the knowledge management of curriculum designs **Deadline: N/A**	**Development of policies on the knowledge management (KM) of curriculum designs through the creation of a "knowledge management and archiving" working group.** Owing to the analytical and intellectual potential of the curriculum designs captured in the C-CAP central repository, it is essential that an appropriate KM policy framework accompanies their long term curation [9], [32], [56]. Such a policy should seek to formalise the technical management of the designs, their re-use and sharing (i.e. harnessing existing intellectual capital), lifecycle management, the promotion of exemplar designs, establish protocols for design adaptation and resubmission to the approval process, and policies to foster institution-wide promotion of the repository. The wide remit of such a policy necessitates involvement from a wide number of stakeholders, including the Directorate of Strategy & Policy, Information Governance & Compliance, AQ teams, etc. Resolution of this matter is therefore likely to exceed the lifetime of the C-CAP embedding phase and should be considered a longer term objective; however, an objective of the embedding phase should be to establish a working group (comprising stakeholders) to discuss, agree and take forward a policy framework. • Drafting of briefing paper highlighting some of the principal issues to be resolved by a policy framework • Liaise with relevant stakeholders regarding the creation of a curriculum design KM and archiving framework to govern their long term management and their treatment as knowledge assets • Establish a KM and archiving working group (comprising members from relevant stakeholder groups) with the following aims:	**Stakeholder dependency** As noted, this objective is long term and involves a large number of stakeholders. For this reason success will only be possible if all stakeholders participate in – and contribute meaningfully to - the working group. This objective is also subject to monopoly interests, since progress on this matter cannot be achieved without the participation of particular stakeholders.	C-CAP team AQ teams Directorate of Strategy & Policy Information Governance & Compliance

	○ To explore the ramifications of the long term management of curriculum designs, e.g. University policy / regulatory implications, lifecycle management, AQ needs, etc. ○ To agree and work towards a policy and best practice framework designed to govern and harness curriculum designs as knowledge assets. Such a framework should seek to establish clear guidance on the following: technical management of the designs, re-use and sharing, lifecycle management, promotion of exemplar designs, establish protocols for design adaptation and resubmission to the approval process, and policies to foster institution-wide promotion of the repository as an intellectual resource (e.g. to inform practice, share knowledge, etc.).		
5.5 Development of "bridging mechanisms" to coax the "late majority" **Deadline: mid-December 2012**	**Development of "bridging mechanisms" to coax the "late majority" into using C-CAP.** System resistance can assume a number of forms [14], [27], [29]. Whilst elements of organisational inertia may result in system resistance, specific forms of system resistance can emerge if end users are presented with a technically deficient system [27]. The participative approach adopted by the PiP Project and the efforts made to improve user experience have been designed to minimise resistance of this type. Evaluation activity nevertheless found some academic users to be averse to drafting curricula in anything other than MS Word. The reasons for this are explained in more detail elsewhere [32]. To contribute to a gentler transition between the previous and new state it is necessary for bridging mechanisms to be used. Such an approach aligns with prominent innovation diffusion techniques [51] and its application within the information systems domain demonstrates its success [19], [15], [49], [50], [75], [76]. Emphasis is on coaxing the "late majority". Forcing some users to abandon familiar technologies can be counterproductive and the use of bridging options are often advocated whereby some choice in system adoption is provided, at least temporarily [77]. Bridging mechanisms are essential to improve system acceptance among those who are particularly resistant. The following tasks are therefore relevant: • MS Word templates (using form controls) to be generated. These forms should model those served by C-CAP thus enabling existing drafting behaviour to continue while simultaneously exposing users to the structure of the form. Curriculum designs will need to be reproduced in C-CAP and will - as users' system familiarity and confidence increases - encourage drafting to occur directly within C-CAP in future • MS Word templates to be made temporarily available to potentially resistant users • Liaise with AQ teams to ensure faculty policy on MS Word templates is adhered to, i.e. so ensure process subversion is not fuelled, as defined in WP7:38 [32] and summarised in "dependencies / risks".	**Process subversion risk** WP7:38 describes the process subversion issues that can arise from enabling end-users to use a single use applications in organisational processes [32]. Single use applications have been shown to be catastrophic for organisational systems that aspire to be holistic [19], [78]. Some of these issues have been observed in HaSS, e.g. curriculum design authors omitting form fields and uploading MS Word documents instead. Whilst MS Word templates provide a useful drafting tool they should not be considered "instead of C-CAP". AQ teams must therefore be prepared to instruct academics accordingly. Failure to do so may result in sporadic instances of process subversion, whereby academics simply upload the MS Word template versions of their designs into C-CAP, rather than completing the requisite forms.	C-CAP team

4. Appendix A: Scenario-writing: C-CAP embedding scenario

Based on Bardach's [55] work within the area of "implementation games", Keen [26] proposes a customised scenario-writing template for systems implementation based on his concept of "games", i.e. counterimplementation tactics often used to resist, impede or wreck system implementation. This template has been completed in the table below, thus characterising the implementation scenario facing C-CAP embedding.

Scenario category	Scenario factors	C-CAP responses
A. Basic objectives	*What exactly are you trying to get done? (Not what does the system look like?)*	Successful University-wide implementation of the Class & Course Approval Process (C-CAP) system.
	What resources are needed?	C-CAP models and replicates an existing process; successful embedding nevertheless requires the following resources, primarily from specific stakeholder groups: 1. Technical resource from Development & Innovation to continue on-going C-CAP development and improvement 2. Technical resource from Business Systems (IRD) to facilitate improved C-CAP-corporate system integration 3. Faculty management resource to advocate faculty use of C-CAP and coordinate local curriculum approval practices 4. Faculty academic quality (AQ) resource to learn system administration and coordinate AQ practices 5. Resource from faculty-level Academic Committees (AC) to facilitate AC approval via C-CAP 6. Academic resource to become C-CAP literate and understand new curriculum design templates (where these differ from previous practice) 7. Resource from Student Lifecycle to learn administration of registry processes using C-CAP 8. Resource from Ordinances & Regulations to learn administration of O&R processes using C-CAP 9. Resource from key stakeholders, such as library, student services, Estates to receive C-CAP training
	Who controls them, directly or indirectly?	Resources 1, 2, 3 and 4 fall under faculty management control. Resources 5 and 6 fall under SEES control (Student Experience & Enhancement Services) and Strategy & Policy Directorate respectively. Resources for 7 are required from Information Services Directorate (ISD), faculty management, and Estates Management. Resource 8 falls under control of the ISD.
	How can you minimise the effects of social inertia?	Social inertia will be minimised using a variety of techniques (outlined in embedding plan); but including a participative approach to embedding, including the use of local champions, targeting staff training, advocacy, etc.
B. Dilemmas of administration	*What elements are critical to the success of your project?*	Faculty support is the critical element of successful embedding, encompassing elements from resources 1, 2, 3 and 4 noted above. Support from Student Lifecycle and O&R is also critical. These elements are critical owing to their explicit modelling within the C-CAP curriculum approval process. Without proper faculty commitment, C-CAP will not become the principal means of designing and approving new curricula and stakeholders will consequently not receive the information / data therein. Even with faculty support curricula cannot be approved without Student Lifecycle and O&R support, making their involvement a critical element.
	Are any of them subject to monopoly interests?	Successful embedding of C-CAP is subject to a number of monopoly interests. The faculty related elements noted above are those that control directly the use and information flow of curriculum designs, i.e. a "data monopoly" [26]. Any withholding of C-CAP support from faculties, and ergo of academics supplying curriculum information or designs, could present a dilemma of administration. Student Lifecycle and O&R exercise similar monopolies over their activities. Student Lifecycle control the assignation of class and course codes; O&R singularly scrutinise curricula and issue de facto final approval.
	Will their owners be uncooperative?	Student Lifecycle and O&R have demonstrated good cooperation to date and participated in C-CAP piloting. The C-CAP team has also established good communication links with both stakeholder groups. Some faculties may be uncooperative. The C-CAP embedding team has no influence over University faculties and C-CAP uptake cannot therefore be mandated.

Scenario category	Scenario factors	C-CAP responses
	Can you work around them or buy them off?	The centrality of faculty involvement to successful embedding of C-CAP is such that no workaround can be considered. No financial resources are available to incentivise faculty involvement; although training support and other forms of assistance can be offered.
	Will they respond with delays or tokenism?	Owing to competing priorities and/or general inertia – and their monopoly status - delays and tokenism are likely to occur. Faculty involvement requires an entire faculty to alter its curriculum design and approval processes. Their monopoly status is such that they are likely to prefer a delay to implementation, until such time as its timing and priority status is considered to be favourable.
	How will you deal with massive resistance?	System resistance will be addressed in detail within the embedding plan. As section 2.2 reports, the system context for C-CAP is favourable. Resistance will broadly be dealt with by adopting elements of Keen's [26] "countercounterimplementation" (CCI) strategies; although it should be acknowledged that C-CAP deployment lacks "a contract for change" [26]. Resistance is also expected to be ameliorated via extensive (and targeted) staff training, user support services, the identification of local champions who will become "change agents", fluid staff-management-system team communication, advocacy and outreach work. It is also an aim that support from Vice-Dean Academics will be sought in order to provide some level of management endorsement.
C. Games	*What games are likely to* *a) Divert resources?* *b) Deflect goals?* *c) Dissipate energies?*	"Resource deflection" games are unlikely to occur since no financial incentives are being used to facilitate system implementation. "Goal deflection" games are also unlikely; although the "pile on" approach may occur whereby faculties – or departments within faculties – demand system functionality which cannot be delivered. Keen [26] and Bardach [55] define the "pile on" as a goal deflection strategy whereby a group or stakeholder insists that the project is more complex that it might first appear to be and that their interests need to be better represented. ("Let's do it right! We have to make sure our interests are included in the project"). Of the three game types, "Energy dissipation" is the most likely to occur, within which "tenacity" and "odd man out" are most likely. "Tenacity" exploits social inertia and independencies (e.g. "No", "One more time", "We're not happy about…") to delay the project until one's (often pedantic) demands are met. "Odd man out" creates an option for the stakeholder to withdraw if the project does not proceed as planned. "Odd man out" emerges out of project uncertainty and often inspires tokenism from the stakeholder until the project's level of success becomes clearer [55]. Reticence and the lack of commitment associated with "odd man out" often stymies progress and project activity, making its failure a near certainty. Faculties (including academics, but particularly faculty management and AQ) are likely to employ these tactics.
	How can you counteract or prevent them, if necessary by redesigning the project?	Secure firm agreement from stakeholders regarding the obligations under their involvement to usurp "odd man out". Rely on advocacy, training, outreach and face-to-face interactions with key personnel to ensure "tenacity" is minimised.
D. Delay	*How much delay should you expect?*	The large number of stakeholders involved, the negotiations required to recruit faculties, the bedding-in time (e.g. time for staff training and competency) would suggest that delays are highly likely. Curriculum design also tends to be cyclical. It may therefore be the case that there are few classes and courses submitted for approval, even if the system (at a technical level) has been implemented successfully.
	What negotiations are needed?	Negotiations are required with the Faculty of Science, Strathclyde Business School and Faculty of Engineering. This will entail liaising with faculty managers, Vice-Dean (Academics) and AQ teams. Negotiations with Student Lifecycle and O&R appear to be complete and were conducted ahead of HaSS piloting of C-CAP (conducted circa March – May 2012).
	What resources do you have for negotiations and/or control?	There are no tangible resources for negotiation.
	Would it help to use project management, work around possible obstacles and delay or enlist intermediaries?	An embedding plan (above) will be adhered to in order to maximise the possibility of project success. Local champions (change agents) will be enlisted early in the embedding phase and it is hoped that these participants will mitigate energy dissipation games.

Scenario category	Scenario factors	C-CAP responses
E. Fixing the game	*What senior management and staff aid do you need?*	The C-CAP embedding phase would benefit from greater support and prioritisation from senior management, specifically within faculties. Such support is required in order that the C-CAP team's activities are considered legitimate and necessary. It also provides a contract for change and provides a suitable foundation for the participative bottom-up embedding strategies outlined in section 2.1 and section 3.
	What resources do they have?	Senior management have limited resources; but commitment of significant resources is not required for them to become a minor "fixer", i.e. "a person or group with the prestige, visibility, and legitimacy to facilitate, deter, bargain, and negotiate effectively. Information systems teams often lack this key support" [26]. Management in this instance are described as a minor fixer because their involvement in is required for reasons of prestige, visibility and legitimacy, rather than the other
	What incentives are there for them to play the fixer role?	Improvements in faculty level curriculum approval process efficacy and transparency, mechanisms to enable responsive curriculum design, tools to better support academic quality (including enhanced reviewing mechanisms and approval management), system setting minimum level of curriculum design, knowledge base of curriculum designs and ability to share practice, etc.

5. Appendix B: C-CAP embedding and sustainability meeting

05 Sept 2012, Turnbull Building

Present: Emma Graham (EG), Jim Everett (JE), Rehman Mohamed (RM), George Macgregor (GM)

1. **Welcome**
    a. GM summarised the purpose of the meeting as an opportunity to discuss and agree a forward plan for the longer term development and management of C-CAP. GM also noted the need to gain clarity on the objectives of the JISC embedding phase (due to conclude April 2013) and hoped that this could be incorporated into the discussions.
2. **Agree objectives for C-CAP embedding**
    a. If it could be secured, EG and JE recommended the recruitment of Catherine Milligan (Head of Learning Technology Enhancement) as a C-CAP champion. CM's role in learning technology could give added gravitas to the advocacy effort required for successful embedding. Incorporating CM's involvement was therefore agreed by attendees as an important component of any embedding strategy.
    b. EG and JE also noted the role of KIS as providing another "driver" for faculties since it is anticipated that C-CAP will be the principal channel for updating KIS data.
    c. JE recommended that the embedding strategy incorporate greater ownership of C-CAP from academic quality teams. This might entail the use of C-CAP as the delivery mechanism for more generic curriculum information for faculty academics, e.g. on the nature of the HaSS curriculum renewal initiative. Such use may promote greater advocacy from AQ in their capacity as local champions or change agents.
    d. GM noted the importance of participative embedding strategies in successful system implementations and that the promotion of training and RM's training materials were an important component. GM noted that additional training / refresher sessions for AQ teams may be required to maintain engagement.
    e. EG suggested that course coordinators could provide additional advocacy, as well as an additional layer of support for users. These would be "super users" with extensive knowledge of the system such that simple local issues could be solved locally. JE questioned whether this would work when the approval process is a faculty one. There was nevertheless agreement that academic champions could prove useful in communicating the benefits of the system. EG recommended that the involvement of Catherine Milligan and course coordinators be clearly delineated in a governance structure within the embedding plan.
    f. GM asked attendees whether it would be possible to agree objectives for the embedding phase. GM asked whether agreement could be met on the number of faculties that could reasonably be expected to be using C-CAP for curriculum design and approval by end April 2013 (i.e. for JISC reporting). Both JE and EG noted that expectations should be managed since D&I was not in control of faculties nor could C-CAP's use be mandated across the institution. JE noted the large number of stakeholders involved to expedite University-wide adoption of C-CAP, making embedding difficult. All attendees nevertheless agreed that the embedding phase should seek to recruit as many faculties as possible and pursue those faculties that have hitherto had other priorities.
3. **Plan for on-going development of C-CAP**
    a. GM noted the lengthy and growing "to do" list of C-CAP technical enhancements and suggested that it would be useful to clarify how this work will be managed and prioritised during the embedding phase, particularly given RM's other responsibilities.
    b. It was agreed that GM would arrange a meeting at which the C-CAP "to do" list would be reviewed and its contents prioritised.

c. JE noted that the plan for on-going development was within the control of D&I. Formulation of objectives should therefore focus on the on-going development of C-CAP. JE proposed four areas of C-CAP development:
    i. Improving integration with corporate systems
    ii. Improving the system and user experience in line with feedback / evaluation outcomes
    iii. Increasing the functionality, including C-CAP as a mechanism for pushing information to KIS on Pegasus
    iv. Promoting and developing C-CAP to be more holistic; providing an environment in which greater curriculum information, communication, etc. could be achieved.
d. GM reported that he would use these overarching objectives as a framework for aspects of the work plan, to be incorporated within the embedding plan.
e. GM noted that the PiP Final Evaluation Synthesis report included a series of recommendations. GM sought agreement from attendees that these should be included and prioritised within the plan. Attendees agreed.
f. GM also noted that among the recommendations was on-going evaluation, including the capture of further user feedback and the collection of Pareto data. A discussion ensued as to the best mechanisms for capturing this data. It was agreed that GM should consider evaluation within the embedding plan and possible mechanisms for best capturing Pareto data.

4. Long term management of curriculum designs

a. Attendees noted the importance of finding clarity and policies on the long term management of curriculum designs, including archiving, lifecycle management (including retention for auditing, thresholds to govern changes to existing designs, etc.), academic quality review, and so forth. Included within this attendees noted the requirement to establish a clear strategy on the novel reuse and harnessing of curriculum designs as knowledge assets.
b. Attendees noted the number of stakeholders that would be required to facilitate a resolution to these matters, including academic quality teams, Catherine Milligan, University archives (Victoria Peters), Information Governance & Compliance, etc.
c. EG suggested that resolution of this matter would likely exceed the lifetime of the embedding phase but that the plan should incorporate a strategy for forming a working group to address the issue. Such a working group would be expected to comprise the key stakeholders.

Actions

- GM to complete embedding plan, as per minuted discussions.
- GM to meet JE and RM to discuss and prioritise the C-CAP technical development “to do” list.
- GM to formulate suitable evaluation mechanisms to capture Pareto data.
- GM to formulate strategy to take forward the issue of class/course proposal archiving, including the formation of a working group. Details to be included in the embedding plan.

GM 05/09/2012

C-CAP embedding and sustainability meeting

05 Sept 2012, Turnbull Building

Agenda

- Agree objectives for embedding
  - What should be achieved by April 2013?
  - Implementation of evaluation recommendations
  - Faculty involvement

- Plan for on-going development of C-CAP
  - Plan of work; priorities
  - How will this be managed?

- Long term management of curriculum design
  - Archiving
  - Long term access and reuse

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